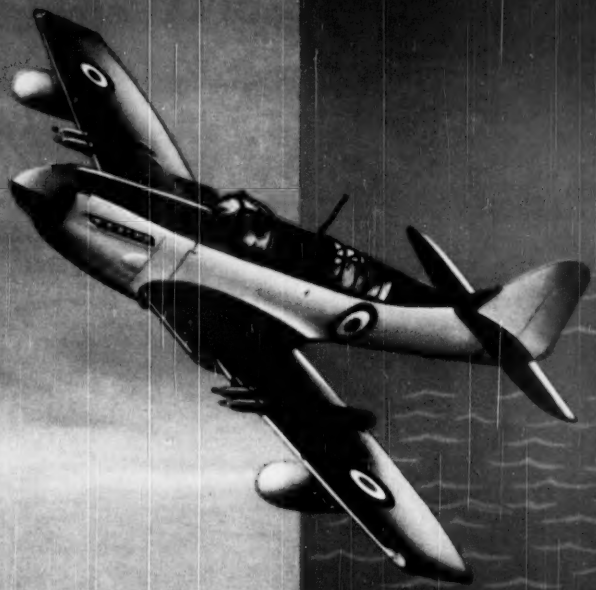
FLIGHT

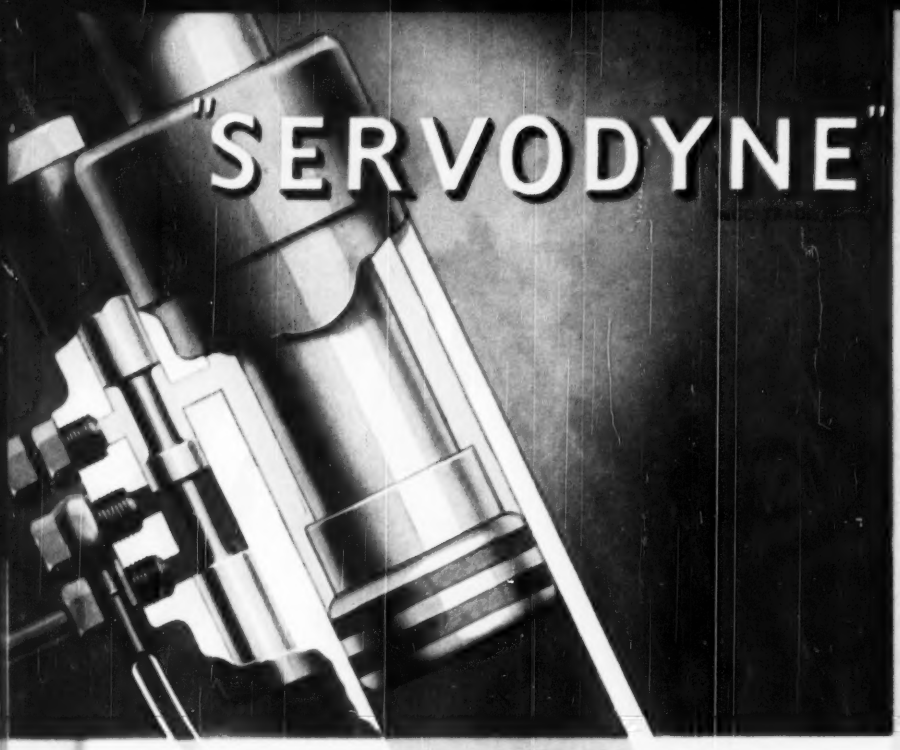
and AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB



THE VERSATILE *'Firefly'*

THE FAIREY AVIATION CO., LTD., HAYES, MIDDLESEX



"SERVODYNE"

SERVO-ASSISTANCE SYSTEM

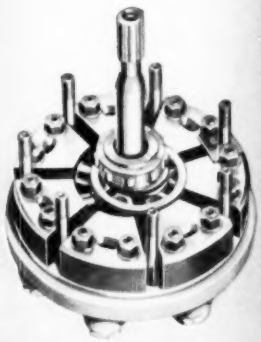
Positive control of the servo-assistance system is effected by a special feature of design, since the flow to only one side of the piston has to be controlled by valve. The pressure on the annular area being permanently maintained, the dead period due to ordinary valve 'overlap' is avoided, and the fluid, moreover, is always 'pre-loaded', avoiding low-rate 'give'.

The Servodyne is used in conjunction with the Lockheed high-precision pump, famous for its reliability.

AUTOMOTIVE PRODUCTS COMPANY LTD., LEAMINGTON SPA

A Lockheed main shock-absorber strut for one of the fastest jet-fighters.

A Lockheed light-alloy hydraulic jack.

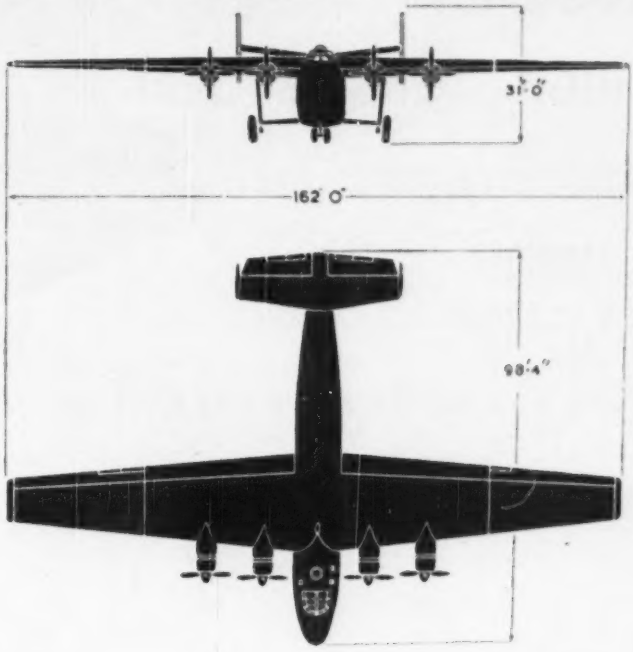


The Lockheed Mark VI high-precision hydraulic pump.

ALL-BRITISH

Lockheed

THE UNIVERSAL FREIGHTER



Introduces—

Economic Air Haulage

15 TONS CAPACITY

TAKE-OFF RUN 585 YDS.

CRUISING SPEED 175 M.P.H.

BLACKBURN & GENERAL AIRCRAFT LIMITED, BROUGH, EAST YORKS

RUMBOLD

WEIGHT 34 lbs.!

TRIPLE HIGH DENSITY SEAT

A VERY COMFORTABLE CHAIR

ARB APPROVED

NOW IN SERVICE

RUMBOLD—ALWAYS ABREAST OF THE TIMES

L. A. RUMBOLD & CO. LTD., KILBURN, N.W.6 Telephone: MAIDA Vale 7366-7-8

Behind every Teddington component there stands a wealth of knowledge and experience born of close co-operation with the aircraft and engine constructors over a long period, and the complete concentration of our organisation on the design and production of aircraft control equipment.

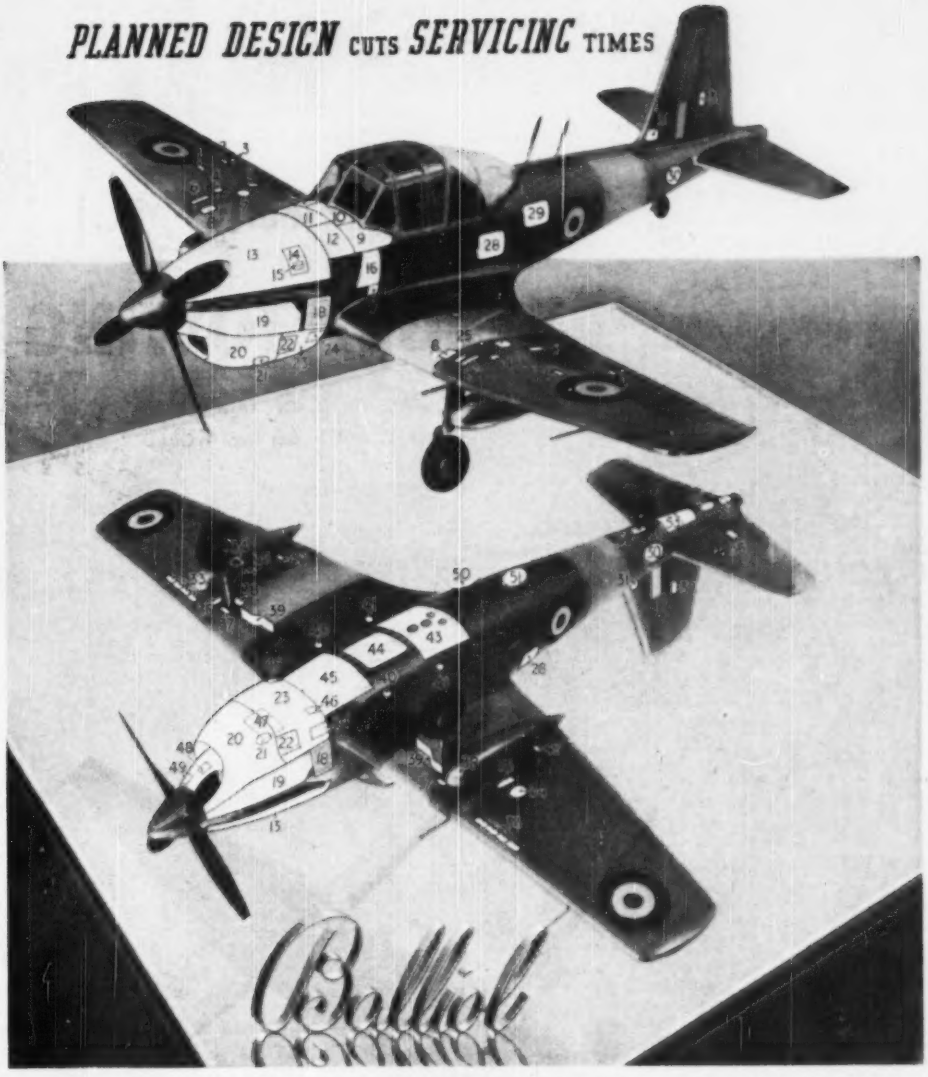
This is the guarantee for those who build and those who fly.

Teddington CONTROLS

TEDDINGTON CONTROLS LTD.

Cefn Coed, Merthyr Tydfil, South Wales. *Tel.: Merthyr Tydfil 666.*

PLANNED DESIGN CUTS SERVICING TIMES



In the design of the Balliol, "considerations for maintenance accessibility have been given a higher place than, perhaps, that given in any other aircraft yet built." ("Flight", 17.7.48)

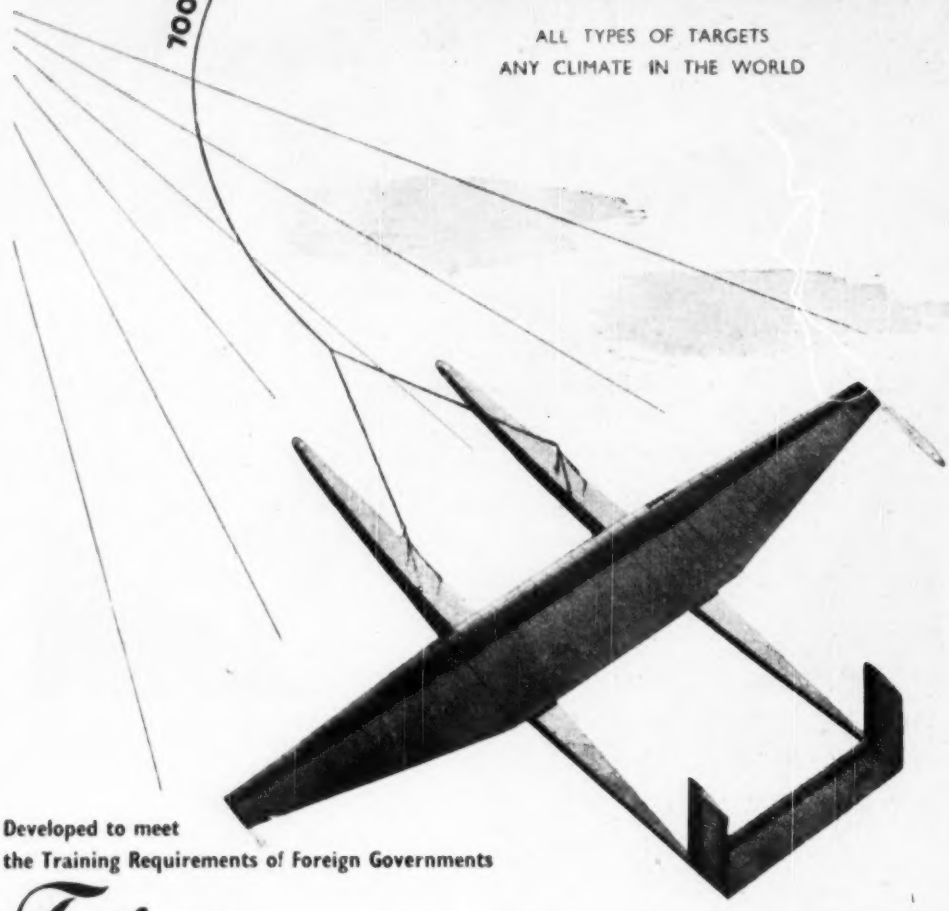
Wherever structure or equipment needs periodic attention, ready access is provided through detachable panels or doors. The assistance of Planned Servicing is invaluable.

Boulton Paul Aircraft Ltd Wolverhampton

7000 FEET (2150 METRES)

Fairey "Firefly" Mk. I
for
TARGET TOWING

ALL TYPES OF TARGETS
ANY CLIMATE IN THE WORLD



Developed to meet
the Training Requirements of Foreign Governments

Fairey THE FAIREY AVIATION CO. LTD., HAYES, MIDDLESEX

FLIGHT
and
AIRCRAFT ENGINEER

First Aeronautical Weekly in the World

Founded 1909

No. 2143 Vol. LVII. THURSDAY, 19 JANUARY 1950

EDITORIAL DIRECTOR
G. GEOFFREY SMITH, M.B.E.

EDITOR
MAURICE A. SMITH, D.F.C.

ASSISTANT EDITOR
H. F. KING, M.B.E.

TECHNICAL EDITOR
C. B. BAILEY-WATSON, B.A.

ART EDITOR
JOHN YOXALL

Editorial, Advertising and Publishing Offices :

DORSET HOUSE,
STAMFORD STREET,
LONDON, S.E.1.

Telegrams : Flightpress, Sedist, London.
Telephone : Waterloo 3333 (60 lines).

Branch Offices :

COVENTRY
8-10, Corporation Street.
Telegrams : Autocar, Coventry.
Telephone : Coventry 5210.

BIRMINGHAM, 2.
King Edward House,
New Street.
Telegrams : Autopress, Birmingham.
Telephone : Midland 7191 (7 lines).

MANCHESTER, 3.
260, Deansgate.
Telegrams : Iliffe, Manchester.
Telephone : Blackfriars 4412 (3 lines).
Deansgate 3595 (2 lines).

GLASGOW, C.2.
26b, Renfield Street.
Telegrams : Iliffe, Glasgow.
Telephone : Central 4857.

SUBSCRIPTION RATES

Home and Overseas : Twelve months £3 1s. 0d. Six months, £1 10s. 6d. U.S.A. and Canada, $10.00.

BY AIR : To any country in Europe (except Poland). Twelve months, £5 1s. 0d. Six months, £2 10s. 6d. Canada and U.S.A. Six months, $16.

In this issue:

Mignet the Undaunted - 64

Physical Fitness - 67

Radio for Light Aircraft - 75

West-Country Auxiliaries 80

Airfields in a War of Movement - 83

London Airport Ground Traffic - 85

Caging the Bird

IN spite of speed limits, no-parking signs, one-way streets and petrol rationing, about which all of us grumble on occasions, the owner of a motor vehicle enjoys real freedom of action. All that he needs are Road Fund and driving licences, an insurance certificate and perhaps a radio licence; with these, and not forgetting a little book called the Highway Code, the roads of Britain are his.

Until recently much the same could be said of private flying, although there were rather more formalities at "parking areas." In the coming months, however, the amateur pilot's freedom of action is to be progressively restricted in the interests of safety and the orderly control of the increasing commercial air traffic. However willing we may be to acknowledge, in principle, the necessity for this closer control, we must recognize that within a year or so its effect will be to banish from large areas of the home skies all but highly qualified pilots in well-equipped aircraft, particularly at night and when visibility is bad in daytime. So high is the standard of instrument-flying required to obtain an Instrument Rating that it will be virtually impossible for the average club-trained pilot to qualify and distinctly difficult for those who were trained in the Services.

This is not the whole extent of the new problems of the light-aircraft pilot, however, as may be judged from a description and discussion (on pages 75-79 of this issue) of the official radio requirements. The scale of essential equipment represents, apart from loss of payload, an initial outlay of about £400, with perhaps £50 more for installation and formalities. This is now the law, ignorance of which will bring no bliss. "That does it!" as Stewart MacPherson would say, for the resources of most owners and small operators have already been reduced to small change.

The weight of the full radio communication and navigation equipment—V.H.F., S.B.A., cables, aerials and headsets—should not be more than 50 lb; so, if batteries and generator with sufficient capacity are already fitted, the additional load, though serious, is not prohibitive. It represents, in fact, about seven gallons of petrol, or approximately one hour's flying.

Thus it seems that many people will have to "recognize the situation without supporting it," as the current diplomatic cliché goes, and resign themselves to being fair-weather pilots. This is not, in fact, so bad as it may seem, for it must be admitted that most non-professional pilots prefer to stay on the ground in bad weather anyway, and would never fly on instruments unless some very good reason necessitated it. The rub comes when it is imperative that one should get back to base at dusk or in deteriorating weather, and the track to be flown entails passing through a controlled area or zone when Instrument Flight Rules are in force. This is not to say that in such circumstances instrument-flying will actually be necessary.

Considered from a wider viewpoint, of course, the outlook is far less depressing. The Ministry of Civil Aviation is putting a great deal of money and effort into improving traffic control and navigational facilities, and this will be to the ultimate advantage of all pilots, commercial and private alike. Complete V.H.F. coverage for the British Isles is on the way, and provision is being made for increased use of radio range and medium-frequency non-directional beacons. The equipment of all the principal airfields for V.H.F. radio-telephony is already virtually complete.

In the coming months experience will show how the numerous regulations can be interpreted in practice, and how much, in fact, they will interfere with, or sometimes aid, the non-professional pilot. The fitting of V.H.F. radio costing a great deal less than the £400 mentioned for full-scale equipment may prove to be sufficient to obtain clearance for the majority of flights that a pilot of a light aircraft will wish to attempt. It is also to be hoped that flying-control staffs will be able to offer private pilots the same sympathetic and helpful treatment which is so much appreciated to-day: this, at least, will go a long way towards softening the blow.

MIGNET the UNDAUNTED

Unconventional-aircraft Designer, Now in South America, Sings a New "Song of the Flea"

For hangarage at home: the new H.M. 300 three-seater with wings folded.

By A. R. WEYL, A.F.R.Ae.S.*

ABOUT sixteen years ago a French amateur designer of ultra-light aircraft, M. Henri Mignet, caused enormous interest by evolving an unconventional aircraft named *Pou-du-Ciel* (i.e., "sky-louse"—politely mistranslated in England as "flying flea"). It was of extremely unconventional design, having a variable-incidence wing, without ailerons, to act as elevator; and it was of very primitive construction. Its designer semi-seriously claimed that anybody who could nail a box together could construct it, and that anybody could teach himself to fly it.

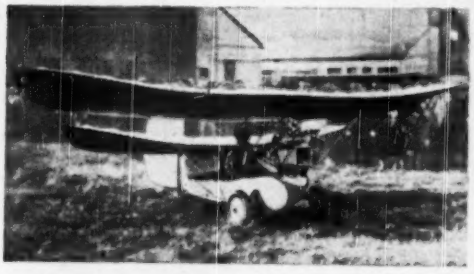
"Able designer and skilled pilot"—M. Henri Mignet.

Aerodynamically, this remarkable vehicle could have been described as a virtually tailless aircraft with the wing divided by a wide slot-gap into front and aft surfaces of about equal size. The peculiar arrangement could equally well be called a "close tandem" aircraft, or a biplane with abnormal forward stagger and small gap. It was, in fact, a "flying slot" as long as a slot effect was present, and a tandem or "tailplaneless" when the flow through the slot gap was no longer effective.

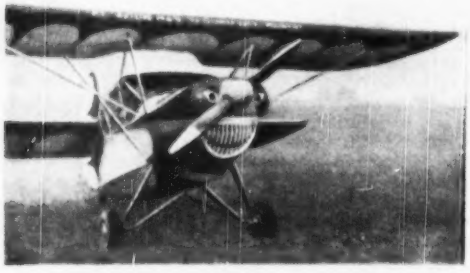
The original *Pou-du-Ciel*, the H.M. 14, caused a veritable sensation among those enthusiasts who believed in flying for fun but could not afford it. All over the world it started a popular-flying movement. Hundreds of these little aircraft were built and many, but not all, took the air. Home construction by amateurs was promoted by Mignet with the eager assistance of M. Georges Houard, editor of the French journal *Les Ailes*. In this country, the Air League of Great Britain, under the enthusiastic leadership of Air Commodore Sir Adrian Chamier, achieved the considerable feat of getting the *Pou* and all other ultra-light aircraft liberated from airworthiness regulations and given permanent "Permits to Fly" against adequate third-party insurance.

The movement, however, came to grief after a number of fatal crashes had proved beyond doubt that the type was deficient in safe-flying qualities. All the accidents showed an identical symptom—a nose-dive from which the pilot could not recover; moreover, the majority of the victims were skilled and capable pilots.

It took much effort and time to discover the exact cause of the trouble, which was undoubtedly aerodynamical. Mignet himself, on the basis of daring and skilful experiment in the air, lost no time in discovering a quick and satisfactory remedy. But when he came forward with it and offered proof that the *Pou* was now safe, he met scepticism and even open animosity. Heated arguments for and against Mignet's formula and airplanes had caused so much nervousness that the *Pou-du-Ciel* was condemned once and for all. Looking back, one feels that both the official mind and the public opinion were gravely in error, and that ultra-light aeronautics suffered unfairly as a result. Engineering progress should not be mixed up with unsubstantiated prejudices.



M. Mignet in the original H.M. 14 Pou-du-Ciel at Orly in 1935.



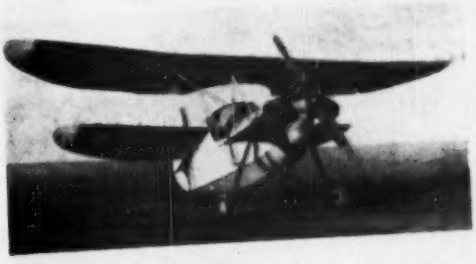
This view of the H.M. 300 explains the nickname "Wild Beast." Eyes and mouth are design-features, and only a few suitably artistic touches with a paint-brush were added.

It is true to say that M. Mignet himself was not entirely without fault in the matter: likeable as he is in person, he is a genius and typically French, besides being an artist in temperament (by profession, he is a research engineer who has acquired great merit in the development of radio valves). To be a genius means to be misunderstood, and Mignet preferred to play the rôle of an aeronautical jester;

* *The author is a member of the executive committee of the Ultra Light Aircraft Association.*

he pretended to be an amateur, and a timid, ham-fisted creature at the controls of an aircraft. In fact, he was (and still is) an exceptionally gifted and experienced aeronautical scientist, a very able designer and constructor of unorthodox aircraft, and a skilled experimenter (he constructed and operated his own wind tunnel); that he is a pilot of skill and courage is obvious to all who have seen him fly. He possesses a strong sense of humour which is apt to express itself in wit (an attribute usually disagreeable to experts and authorities); and he has a strong will that is disinclined to humble itself before those in power. All this may help to explain the sad pre-war history of the *Pou*.

Actually, the fatal design-deficiency of the original H.M. 14 arose from the fact that in such a design the vital slot-effect disappears at small angles of incidence. In this condition the wing combination behaves as a single-wing system of pronounced camber; it is unstable at the normal c.g. position, and the aircraft tries to assume a stable attitude. This means that it tries to fly inverted. The pilot is unable to prevent the tendency, as the front wing (which acts as elevator) becomes ineffective in the absence of slot effect. This also has a connection with the fact that



The H.M. 294 single-seater has a 35 h.p. Aeronca engine.

most of the victims were skilled pilots: they sensed that the elevator produced little effect and instinctively put the stick farther forward in an effort to fly faster (as would have been correct with a conventional aircraft): this very action produced the catastrophe.

Mignet quickly realized the true position after participating in full-scale wind tunnel experiments at Villacoublay in 1936; and he came to the conclusion that a sure remedy could be achieved by excluding the possibility of flight at small incidences. He tried three different design solutions in succession ("conjugated wings"; auxiliary conjugated elevator flaps in the after wing; and strongly reflexed aerofoil section in the after wing), and thus ensured that no nose-dive could commence or be sustained without producing a tail-heavy pitching moment with the increase of speed.

Mignet fully achieved his purpose in the same year and demonstrated several modified "flying slots," besides publishing in detail the modifications which were required to make the H.M.14 safe. But it was already too late.

One has seen little acknowledgement that, after the introduction of these remedies, no further fatal crash occurred in any *Pou-du-Ciel* or derived aircraft, and that in 1938 a Mignet two-seater "flying slot" qualified for the French Certificate of Airworthiness (passenger transport) after more than 500 hours of actual flying trials in the air.

To-day, Mignet works in Argentina, whence he emigrated after the death of his wife. It is, perhaps, significant that this jesting preacher in a desert of aeronautical procrastination has now proceeded from his "Sky Louse" to a "Butterfly" (H.M. 294) and to a "Wild Beast" (as he calls it), the new H.M.300. But he still labels his "flying slots" proudly and with justification "*Los Aviones mas Seguro del Mondo*" (the safest aircraft in the world").

The two new types are built to the typical *Pou* formula, with two-control system, variable-incidence front wing as elevator, missing ailerons, and all. H.M. 294 is a single-

Characteristic plan-form of the species—H.M. 294 from below

seater with an American-built Aeronca engine of 35 h.p.; H.M.300 is a three-seater with a 125 h.p. Continental flat four. Under construction is a two-seater with an 85 h.p. engine in the class of the Ercoupe or Luscombe Silvaire personal aircraft. In the design stage M. Mignet has a high-speed single-seater of exceptionally low weight.

In both new types shown in the accompanying photographs the outer portions of the wings are foldable for transport and housing, as will be seen from the view of an H.M.300 under tow. A characteristic of all Mignet aircraft has been their extreme simplicity. The designer has found it hard to work in Argentina, and the non-availability of some materials and accessories has made the two prototypes heavier than they were intended to be. Nevertheless, both aircraft perform well, though the engines are second-hand and somewhat deficient in output.

Unbiased (or, more correctly, rather sceptical) passengers in the persons of professional aeronautical engineers have given glowing reports about the flying qualities of the H.M. 300. Praised in particular are the amazing manœuvrability and stability (in all directions), and the fact that the aircraft cannot be made to spin. An aerodynamical

Comparative elevations of the H.M. 294 single-seater (top) and H.M. 300 three-seater. The latter has a 125 h.p. Continental.

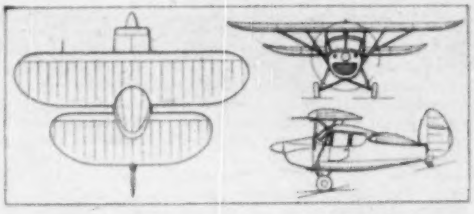
MIGNET the UNDAUNTED . . .

investigation shows, indeed, that a flying-slot arrangement *à la Mignet* should be free from autorotation. Stalling takes place at about 40 m.p.h. I.A.S., but the *Pou* is free from normal stalling reactions—with the nose at about 45 deg to the horizon the aircraft sinks on a practically even keel, the nose dropping very slowly. This is to be expected, since there is no downwash effect on a tail aft, and because there is no abrupt breakdown of the airflow over the wing. A flying-slot arrangement should actually be the more stable the higher the incidence, and be less sensitive to c.g. location.

Tight turns can be made without skidding or slipping.

POU-DU-CIEL DATA

	H.M. 300 Three-seater	H.M.294 Single-seater
Engine	125 h.p. Continental	35 h.p. Aeronca
Span	24.65ft (7.50 m)	18.15ft (5.50 m)
O.A. width (wings folded)	15.2ft (4.60 m)	8.07ft (2.45 m)
Length	17.3ft (5.25 m)	12.5ft (3.80 m)
Height	7.4ft (2.25 m)	5.6ft (1.70 m)
Wing Area	194 sq ft (18 m²)	108 sq ft (10 m²)
Weight empty	945 lb (420 kg)	396 lb (180 kg)
All-up weight	1,650 lb (750 kg)	618 lb (280 kg)
Wing loading	8.52 lb/sq ft (41.6 kg/m²)	5.7 lb/sq ft (28 kg/m²)
Power loading	13.2 lb/h.p. (6.0 kg/h.p.)	17.6 lb/h.p. (7.75 kg/h.p.)
Cruising speed	106 m.p.h. (170 km/h)	81 m.p.h. (130 km/h)
Endurance	4 hours	5 hours



General arrangement of the H.M.300

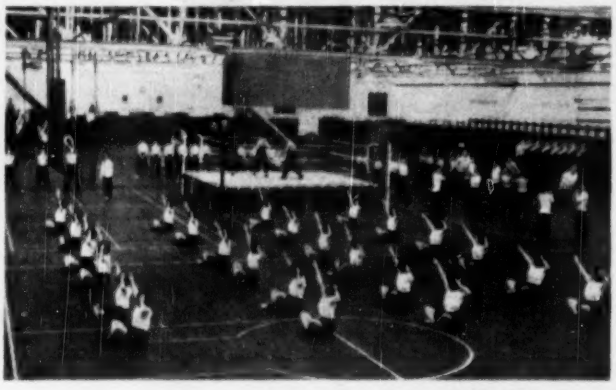
in spite of the absence of ailerons. Mignet hangs a plummet on a string from the cabin roof and shows that even in 45-deg turns it does not alter its position in relation to the cabin walls.

Last November both Mignet aircraft qualified for a Permit-to-Fly, and a Certificate of Airworthiness can be safely expected. The cruising speed quoted here for the H.M.300 refers to the aircraft with a "best-climb" airscrew; at high speed no more than 85 h.p. is actually utilized.

The writer is indebted to M. Henri Mignet and Mr. E. P. Zander, A.R.Ae.S., for supplying him with material for this article.

PHYSICAL TRAINING

—as Applied to the R.A.F.; Activities and Background of the P.T. School at Cosford



Potential instructors, under training in the magnificently equipped gymnasium at Cosford.

"Flight" photograph

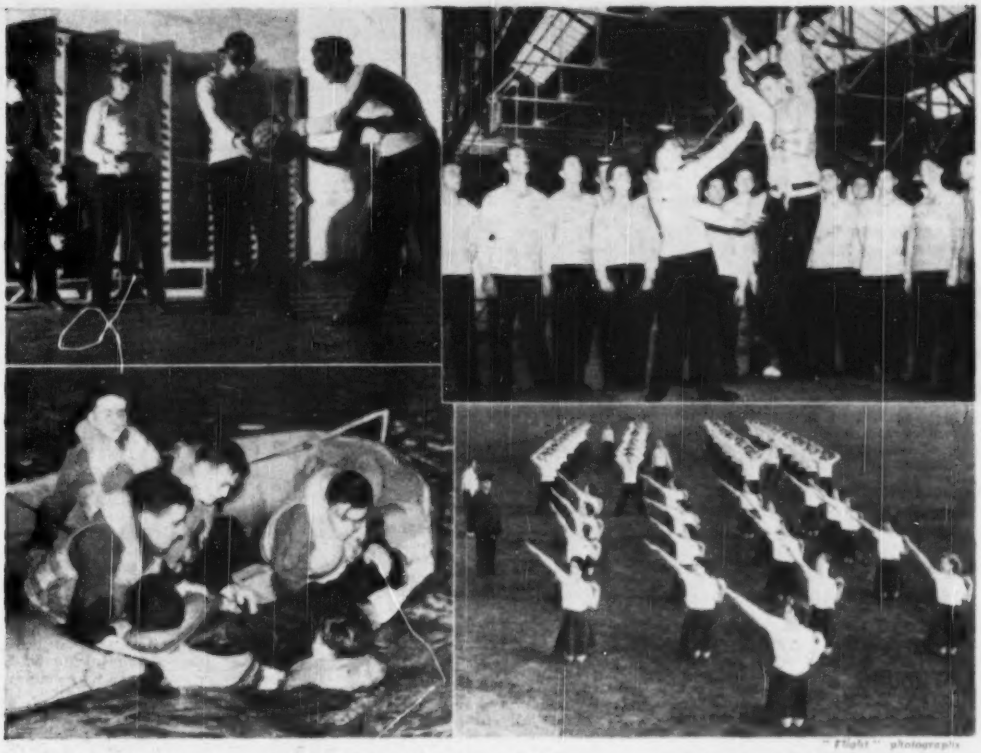
WITHIN the relatively short span of its existence, the Royal Air Force has produced many notable athletes and sportsmen, and it would probably be true to say that in no service is the overall interest in sport more manifest. This enthusiasm is largely an indication of the sound approach made by the Physical Fitness Branch to the problem of maintaining uniformly high standards of P.T. and games at R.A.F. stations the world over.

Recently we were able to inspect the foundation on which this active and continuous programme is laid—the R.A.F. School of Physical Training, which is located at R.A.F. Cosford, Salop (A Cdre. R. J. Rodwell, C.B.E.). Our helpful and knowledgeable guide was the Commandant of the School, W/C. S. J. Jury, who has been closely associated with Air Force athletics for 27 of his 30 years in the Service. He joined as an aircraftman in 1920, became a P.T.I. three years later, and has since represented the R.A.F. in inter-Services fencing and staged many displays of gymnastics, among them those at the Royal Tournament.

Instructors at the School include F/L. W. H. Turner, one of the R.A.F.'s greatest swordsmen; Flt/O. N. Fernihough, W.R.A.F. badminton champion; F/S. E. M. Osborne and Sgt. J. Bryson, W.R.A.F. fencing champions, and Cpl. E. Davies, R.A.F. and I.S.B.A. welterweight boxing champion.

Although the tempo of the School's activities is less intense now than it was during the war, several courses are in progress. There are six intakes of 24 potential R.A.F. P.T. instructors and two W.R.A.F. courses of similar numbers. The male courses last 18 weeks and the 12-week W.R.A.F. course is followed by a month's general service training. All P.T.I.s hold the minimum rank of corporal. In addition, reclassification and advanced courses are held (the latter last six months and may be followed by promotion or commissioning), and direct entrants—including National Servicemen—from civil colleges of physical education are given short "conversion" courses before becoming physical-fitness officers. The School is responsible for preparing gymnastic displays for recruiting and other purposes.

Its training facilities are magnificent. Under one roof are the gymnasium, elaborately equipped and well over 25,000 sq ft in area; a drill hall and secondary gym of equal size; a heated swimming pool; and the Station's chapel, cinema and concert hall. There is a two-fold theme behind the School's syllabus. First, its graduates must be able to impart their knowledge under adverse climatic and terrestrial conditions and make the best of inadequate equipment; secondly, subjects must, wherever possible, have a definite application to every facet of Service activity, flying or ground. As a result, the curriculum is unusually extensive. During his course, a male P.T.I. receives instruction in practically every type of apparatus work, athletics, e.g., pole-vault, shot-put, hammer-throw, and hurdles; fencing; boxing; wrestling and almost all outdoor



"Flight" photographs

During their 18-week course at Cosford, P.T. instructors are given background experience later imparted, in turn, to aircrew trainees: (top) night-vision practice with tinted goggles in a darkened room and a demonstration of parachute-descent control, and (lower left) dinghy rescue in the station swimming-pool. In the fourth view, W.C. Jury, the Commandant, superintends exercises on the playing-fields. Display teams for special occasions, such as the Royal Tournament, are trained at Cosford.

sports. He is, of course, also taught how to organize classes and games on similar lines. Fencing—which enjoys considerable popularity in the R.A.F.—is held to be a particularly profitable pastime for aircrew, in that it demands, and develops, quick reactions. Rifle exercises, obstacle work and weight-carrying are items applicable to ground-crew training.

In the Station swimming-pool, trainees clad in denims, parachute harness and Mae West are given thorough instruction in the use of dinghies and in search and rescue drill. Although the P.T.I., in the normal course of his duties, is unlikely to make operational use of such knowledge, he may be called upon to instruct aircrew candidates. The same is true of parachute-descent control and landing, also taught at Cosford from the aircrew angle, as opposed to parachute-troop training. R.A.F. parachute-jumping instructors, who train troops and the "paramedical" teams at Upper Heyford, all undergo the complete P.T.I. course at Cosford before beginning their own arduous parachute training. A third aircrew subject treated at the School is night vision training, but only the groundwork is given. Trainees, wearing tinted goggles, practice games and exercises in varying degrees of darkness.

The W.R.A.F. programme avoids the more strenuous types of exercise, such as apparatus-work, and concentrates on the development and improvement of poise and rhythm.

The School of Physical Training is by no means an innovation; in fact, it was formed, at Cranwell, in 1918, its instructors being drawn from the Army and Navy. In the following year, the School moved to Uxbridge and remained there until 1940, when its efforts were expanded and dispersed between three stations: St. Athan, Loughborough and Cosford. At the outbreak of war, there were nine physical fitness officers and some 200 P.T.Is in the R.A.F.; by January, 1942, there were 350 officers and 3,500 instructors. The Loughborough and St. Athan schools were closed in 1946, and training has since been concentrated at Cosford, one of the largest R.A.F. stations in Britain, and also a major centre for the instruction of servicing personnel.

NEXT WEEK'S FLIGHT

Greatly Enlarged and Specially Illustrated:

"MILITARY AIRCRAFT OF THE WORLD"

Orders should be placed immediately.

HERE and THERE

"Flight" photograph

ATTRACTIVE OFFERING: S/L. R. Porteous, chief pilot of the Auster Aircraft Co., last Monday began a sales tour of Holland in the trim four-seat Autocar, now in production. Priced at £1,500, the Autocar (D.H. Gipsy I) is among Britain's most economical aircraft.

Global Air Power

NEXT week's (January 26th) issue of *Flight* will be specially devoted to military aircraft of the world. Very fully illustrated, it will form a valuable work of reference for all interested in the subject.

Commonwealth Appointment

AUSTRALIA'S new Minister for Air and Civil Aviation, the Hon. T. W. White, D.F.C., has had a long and eventful career closely associated with aviation. Born in 1888, he was a member of the first flying training course at Point Cook, Victoria, in 1914, and was captured the following year while serving with the Australian Flying Corps in Mesopotamia. He escaped through Russia in 1918, and described his experiences in the book, *Guest of the Unspeakable*.

Before the first world war Mr. White founded the Aero Club of Australia, and has since taken an active interest in the formation and administration of the famous "flying doctor" service of the Commonwealth. During the recent war he served with the R.A.A.F. as a group captain.

R.Ae.S. Anniversary

THE 84th anniversary of the Royal Aeronautical Society was celebrated at 4, Hamilton Place, London, W.1, on Saturday last, when members of the Council entertained their wives to dinner.

Capital Choice

MR. RICHARD G. CASEY, Australia's Minister of Supply, and Mr. T. W. White, Air Minister, made the joint announcement last week that their Government had authorized production, in Australia, of the English Electric Canberra jet bomber.

No information was given as to the manufacture of power units for the Australian-built Canberras; R.A.F. production machines will have Rolls-Royce Avons, but the less powerful Nene is the only turbojet known to be in production in Australia. An experimental Nene-powered Canberra made its first flight last November.

The statement added that reports (which have been current for several months) of Australian production of Hawker jet fighters were "without foundation."

NOW IS THE TIME FOR ALL GOOD MEN...: Mr. Winston Churchill arriving at Southampton last week to begin the election campaign. He made the trip from Madeira, where he had been on holiday, in a Hythe of the Aquila Airways fleet.

Royal Appointment

HER Royal Highness the Duchess of Gloucester has graciously consented to become vice-patron of the Royal Air Forces Association, of which H.M. the King is Patron. The Duchess, who holds the rank of Air Chief Commandant, presented a silver cup to the W.R.A.F. when that service was inaugurated last year, to mark her long association with the W.A.A.F. Serving or former airwomen constitute about 15 per cent of the R.A.F.A.'s 200,000 members.

Paving the Way

ACCOMPANIED by B.O.A.C.'s chairman, Sir Miles Thomas, A. Cdre. Sir Frank Whittle was due to arrive at Karachi on Tuesday to discuss modifications to Karachi Airport involved by the future introduction of Comets to the Empire routes.

The extension of runways at key airfields in tropical or desert areas, particularly those at high altitudes, could solve the problems of the reduced take-off performance of jet aircraft under such conditions. In service, Comets will be given a 10 per cent increase of take-off power by the installation of Ghost turbojets with water injection, and the design has provision for the extra thrust of two Sprite rocket units. Nevertheless, commercial operation will obviously be more economical if the carrying and use of the rockets proves unnecessary.

I.Ae.S. Honours Bristol Designer

MR. A. E. RUSSELL, B.Sc., A.F.R.Ae.S., chief designer (aircraft) of the Bristol Aeroplane Co., Ltd., has been elected a Foreign Fellow of the Institute of the Aeronautical Sciences "in recognition of his outstanding contribution to aviation." Mr. Russell recently delivered the Wright Brothers' Memorial Lecture before the I.Ae.S. in Washington, taking as his subject the design of turboprop transports. (A digest of the paper appeared in *Flight* issues of December 29th and January 5th.)

The election of Foreign Fellows is by several ballots, which narrow the field to three-quarters of the votes for American Fellows. Mr. Russell's name will be announced at an Honours' Night Dinner to be held in New York next Monday.

Tay-Powered U.S. Fighter

THE prototype North American XF-93 penetration fighter arrived at Edwards Air Force Base, California, recently, to begin its initial flight-test programme. Its power unit is the Pratt and Whitney J-42 (U.S. version of the Rolls-Royce Nene) but production models will, according to an American source, have the P.W. J-48, the American equivalent of the Rolls-Royce Tay. With afterburning, says the report, the Tay produces 8,000 lb thrust. Little information may be published concerning the Tay, which has been described as a lighter development of the Nene—more powerful, but of equal size.

The XF-93 is a development of the

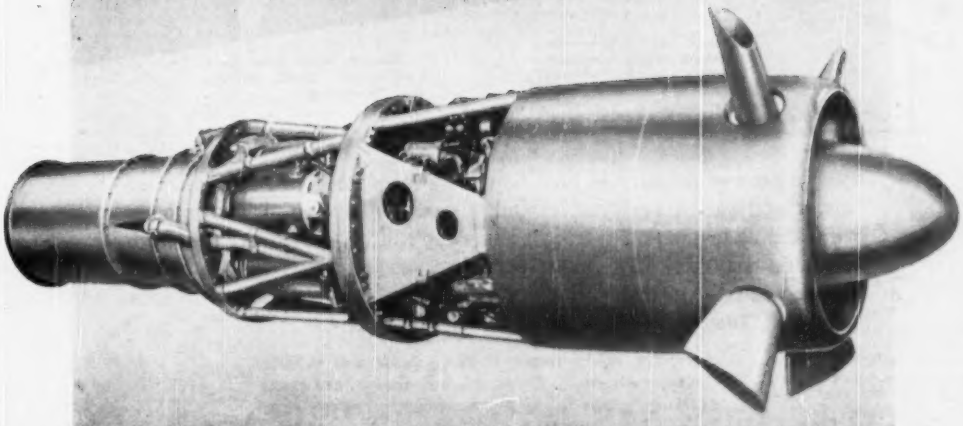
NAPIER NAIAD

PROPELLER TURBINE ENGINE

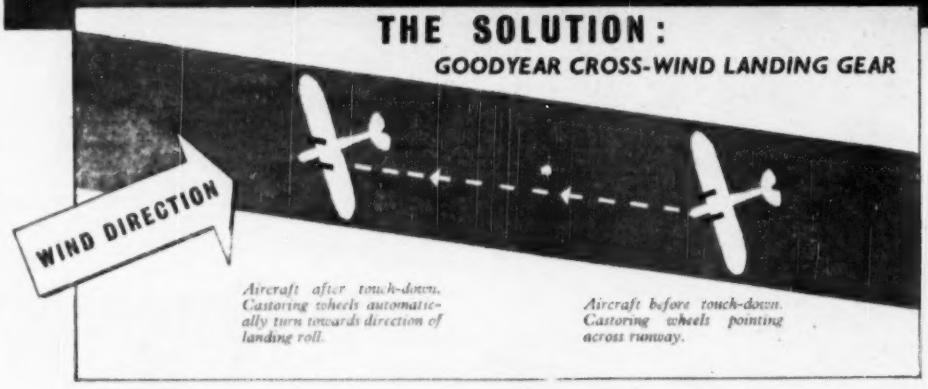
TOTAL E.H.P. — 1590

WEIGHT — 1095 LBS.

DIAMETER — 28 INCHES



D. NAPIER & SON LIMITED LONDON W.3


THE SOLUTION:
GOODYEAR CROSS-WIND LANDING GEAR
WIND DIRECTION
Aircraft after touch-down. Castoring wheels automatically turn towards direction of landing roll.
Aircraft before touch-down. Castoring wheels pointing across runway.

Single runway aerodromes hold no terrors for pilots flying aircraft fitted with Goodyear Cross-Wind Landing Gear. They can make a smooth, safe landing or take-off—straight along the runway—whatever the wind-direction may be. This device permits a yaw of 25° on either side of centre while the aircraft follows a course parallel to the direction of the runway. **The Ground-Looping Bogey is banished.**

A further safety factor is the popular and reliable Goodyear Single-disc Brake, which is always fitted to the castoring wheels of this revolutionary landing gear.

MANUFACTURED BY

GOODYEAR

WOLVERHAMPTON

HERE AND THERE . . .

F-86 Sabre, but has flush intakes in the fuselage instead of the latter's nose-intake, and is considerably heavier (9,500 lb compared with 6,800 lb).

Ringway Expansion

THE Ministry of Civil Aviation has approved a scheme for the extension of the existing main runway at Ringway Airport, Manchester, to a length of 5,000ft, and for enlargement of the apron. When these projects (work on which will begin this year) are completed, a new runway will be built.

News from Australia

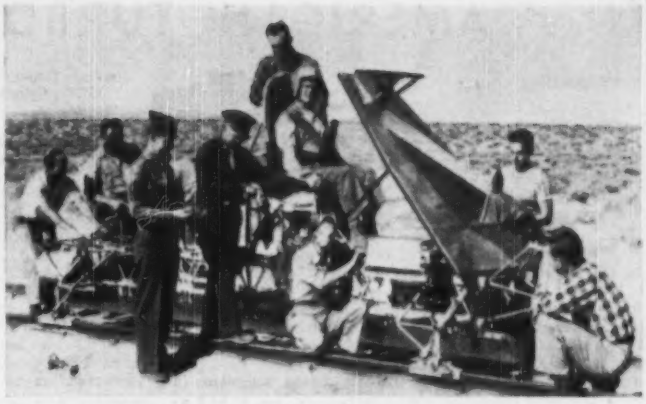
THE first of two prototype Commonwealth CA-22 trainers being built for the R.A.A.F. is expected to fly within the next six months, according to a report from Australia. Production aircraft, it is said, may be powered by a 450 h.p. engine of Australian design instead of the Pratt and Whitney Wasp Junior at present specified. This unit is to be named the Cicada; its manufacturers have not yet been announced.

Production of Vampires for the R.A.A.F. is reported to have been held up by the seven-week Australian coal-strike; the second machine was delivered in December. By mid-1950, production is expected to reach two aircraft per month, and later to a rate ensuring delivery of the complete batch of 50 by the second half of next year.

Most Powerful Turbojet?

A STATIC-THRUST rating of 9,200 lb is quoted for the Allison J-35-23 turbojet, which will be the power unit of future models of Boeing B-47 Stratojet bombers for the U.S.A.F. The first B-47s (suffixed A and B) are powered by six General Electric J-47 axial units (each of 5,000 lb static thrust) and have a maximum speed of over 600 m.p.h. The prototype had earlier J-35 turbojets, with a maximum rating of only 3,750 lb.

The enormous increase in power available to the B-47 will certainly give a higher performance, although, in level flight, the airframe may not be able to take full advantage of over 55,000 lb thrust.



SLOWING DOWN QUICKLY: The Northrop rocket-propelled sleigh with which the U.S.A.F. is conducting tests to determine human resistance to high decelerative forces. The volunteer is preparing for high-speed (175-240 m.p.h.) travel along the 2,000ft test-track, which terminates in a 45ft braking section.

The Brabazon in Detail

A SMALL supply of reprints of *The Story of the Brabazon* is still available. In brochure form, this 24-page supplement (first published in *Flight* of September 29th, 1949) gives detailed information on the design, structure and equipment of the great Bristol aircraft and its power plants, and contains large fold-out two-colour drawings of the interior layouts of the Mk I and II aircraft. The brochure is obtainable at 2s 6d (by post 2s 8d) from *Flight* Publishing Co., Ltd., Dorset House, Stamford Street, London, S.E.1.

NEWS IN BRIEF

THE U.S. Navy has placed an initial order for five Martin P5M-1 twin-engined flying boats of the type illustrated in *Flight* of December 29th, 1949.

* * *

Announced after the publication of the New Year Honours was an additional recognition in connection with the Berlin Air Lift—that of Capt. J. J. H. Charlebois, of British South American Airways, who receives the King's Commendation.

* * *

Mr. Jacques Cochemé, whose articles on gliding and meteorology have been featured in several issues of *Flight* during the past two years, is shortly to leave this country to take up an appointment with the Syrian government at Damascus in connection with the development of meteorological services. At present Syria has no such services, but flying-control and signals officers appointed by arrangement between International Aeradio, Ltd., and the Syrian government, have already started work.

* * *

The London address of Avica Equipment, Ltd. (formerly Aviation Corporates, Ltd.), is 50, Pall Mall, and not another number recently announced.

* * *

The Plessey Co., Ltd., Ilford, have added to their range of Breeze wiring equipment a simple connector for single-core concentric cables. Known as the Mk. 4 concentric plug and socket, it is available in two sizes designed for coupling Unradio 4 and 30 cables.

* * *

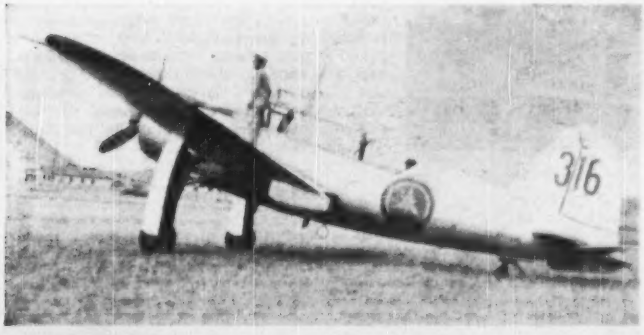
An informal dance for past and present students of the Colleges of Automobile and Aeronautical Engineering is being held on Friday, February 3rd, at St. Mary's Hall, Hotham Road, Putney. Tickets from Miss Sidwell, College House, 72, Princes Way, S.W.19, price 3s 6d.

* * *

The United States Air Force experimental centre at Muroc Dry Lake, California, has been named Edwards Air Force Base, in commemoration of Capt. G. W. Edwards, who was killed while testing a Northrop YB-49 in June, 1948. All U.S.A.F. bases are being named after personnel who have lost their lives in service.

* * *

G/C. E. M. Donaldson, who won the world's air-speed record for Britain in 1946, will act as umpire at the All-England Aircraft Recognition Contest, to be held in the Science Museum, South Kensington, at 4.30 p.m. next Saturday. After the contest he will give a talk on high-speed flying.



IMPERIAL INSPECTION: Haile Selassie, the Emperor of Ethiopia, looks over one of his Air Force's sixteen Saab-17 light bombers during recent manœuvres at Addis Ababa. Other equipment includes six Saab Safirs for training and communications and a number of Avro XIX transports. The Imperial Ethiopian Air Force is commanded by a Swedish officer, Count von Rosen.

AMERICAN TURBOPROPS

Promising New Allison Double Unit

Allison T-40-4 for the XPSY-1 flying boat.

RECENTLY, our contemporary American journals indulged in a little table-turning on the subject of British and U.S. turboprops and, on the basis of the information quoted, there is some justification.

It seems that the Americans have been harbouring the impression that their propulsion engineers were running a poor second to the British in the turboprop field, but that this was due to more stringent security regulations which "forced American manufacturers to keep their products under wraps while the British poured out reams of data on their developments." Following the easing of security by the U.S. Navy on one of its turboprop developments, the Allison XT-40, *American Aviation* is now able to say: "We find, surprisingly, that we not only are *not* a poor second in the turboprop race, but apparently are well ahead of our British cousins."

The XT-40 is a double-turbine unit with the same configuration as the Double Mamba. Each single XT-38 unit (Allison model 501) weighs about 700 lb, and is said to develop no less than 2,750 s.h.p. The combined output of the XT-40 combination is 5,100 s.h.p. plus 1,600 lb thrust, and the total weight of the double unit is given as only 2,618 lb. Even more impressive than the power/weight ratio is the specific fuel consumption, hinted at in the words "in a class with the larger piston-engines in operation to-day (0.63 lb/h.p./hr static sea level)."

Allison turboprops have now completed over 1,700 hours of testing, of which about 25 were in the air. The T-38 flew in the nose of a B-17 last spring.

One of the problems with all turboprops is to obtain satisfactory single-lever control for power and airscrew pitch. The Allison embodies an electro-mechanical system of the company's own design. In addition it has the usual automatic starting cycle. A turbine starter by AiResearch is used to energize the main gas-turbine units.

An hydraulic brake is provided for the airscrews so that they may remain stationary when inoperative. This, it is pointed out, is particularly important for aircraft-carrier work. Even a normal breeze on an airfield is sufficient to cause blades to windmill.

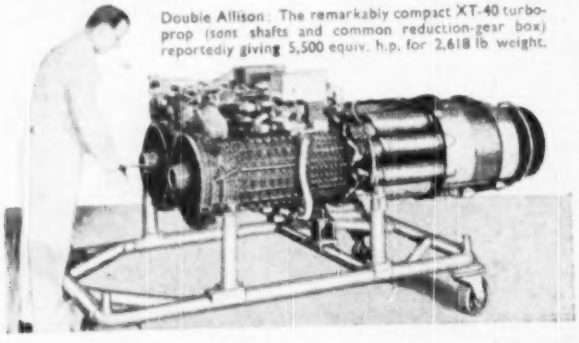
Each XT-38 has a 17-stage axial-flow compressor of very small diameter. Provision is made for tapping for cabin pressurization and the two main shafts extend into a common gear box with two-stage reduction gearing of 15.7:1 ratio. Either section of the combined unit can operate separately, so that for economical cruising one can be closed down. Each section carries its essential accessories but the aircraft accessories are driven from the common gear box.

It is stated that, in contrast to the Coupled Proteus (which "is still in an early construction stage, and its performance figures are estimates, not guarantees") the XT-40 has actually been installed in an aircraft. The machine in question, the Navy Convair XP5Y-1 flying boat, has been referred to in *Flight* on several occasions, but to date we have received no report of its having flown. The hull was launched at the end of November and installation of its four turboprops commenced shortly afterwards.

One of the reasons for the small diameter is the use of four turbine stages, all of which drive both the compressor and the airscrew shaft. There are eight combustion-chambers of conventional design, and the compression ratio is stated to be over 6:1. The compressor casing is of cast magnesium.

Other installations which are in mind for the Allison XT-40, are the new Douglas attack bomber for the Navy, designated XA2D-1, and possibly a version of the new Douglas C-124 heavy transport for the U.S. Air Force. In addition, another Naval attack bomber, the North American XA2J-1, is to have these power units. An interesting civil proposal, namely that the Convairliner should have two T-38s, is being studied. As a try-out the Air Force may be persuaded to install T-38s in one or two of their navigational trainer versions of the Convair.

Variants of the T-40 series turboprops are the T-40-2 with the short extension shaft as required by the Douglas XA2D; the T-40-4 A and B with extension shafts for inboard and outboard nacelles of the Convair XP5Y; and the T-40-6 with a later design of extension shaft and compressor modifications, which is being prepared for installation in the North American XA2J.



Double Allison: The remarkably compact XT-40 turboprop (sans shafts and common reduction-gear box) reportedly giving 5,500 equiv. h.p. for 2,618 lb weight.

KEEN TYPE

"The Take-off," by David Beaty. Werner Laurie. Price 9s 6d.

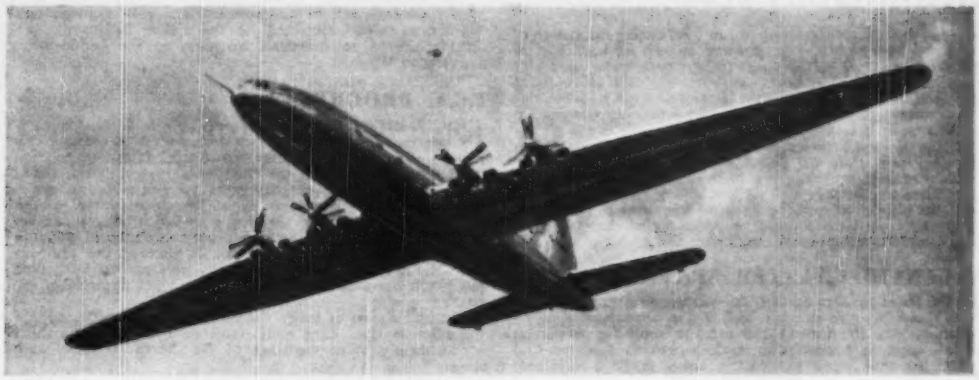
THIS is a story about a Coastal Command station on "Benevona," a typically barren and uncomfortable spot somewhere beyond the Faroes. F/L. Donington, the hero-cum-villain, is one of those ruthlessly efficient characters, and the impact of his personality is conveyed in a series of first-person reactions by other people on the station. It is a story that past and present "Coastal" types will appreciate.

The author, who has a distinguished war-record, is now a B.O.A.C. captain, and is said to have written most of the book in Montreal Public Library between trips. May we now hope for a really good airline novel? Except for Nevil Shute's *No Highway*, we cannot remember having read one.

GALLANT ENEMY

"Rommel," by Desmond Young. Collins. Price 12s 6d.

THIS clear-cut account of a great soldier's career, and of the circumstances of his mysterious "liquidation," was already printed when Brigadier Desmond Young learned that some of Rommel's papers had been recovered. Extracts from these papers have been appended to the book and it is in one of them that Rommel writes of Allied air supremacy. "Anyone who has had to fight, even with the most modern weapons, against an enemy with complete air superiority," he pronounces, "fights like a savage against modern European troops, under the same operational and tactical handicaps and with the same chances of success." Primarily a soldier's book, *Rommel* will appeal to students of war in all Services.



WELL UNDER WAY: As mentioned on page 84 very satisfactory progress is being made with the development programme of the prototype Brabazon I; the aircraft has now logged 29 hours in the course of 14 trial flights

CIVIL AVIATION NEWS

MARATHON TOUR

FOLLOWING a send-off ceremony—graced by a few rays of winter sunshine—at Woodley airfield, Reading, last Saturday, a production Marathon I, G-ALUB, with its crew of five, took off for Blackbushe nearby. From here, after an overnight stay for Customs checks and clearance, the aircraft started its 35,000-mile tour of the Middle and Far East, and of New Zealand and Australia.

G/C. A. F. Bandidt is in charge of the party as commercial manager, and Mr. Hugh Kendall, chief test pilot of Handley Page (Reading), will do most of the flying. G/C. Bandidt flew a Gemini solo over much the same route just after the war, but Hugh Kendall has not been East before. In charge of radio and navigation is Mr. R. A. Constantine who, flying with Silver City Airways, is understood to be familiar with the route as far as Karachi. Mr. R. C. Hobbs is the service engineer, and Mr. J. Parker, lent by the de Havilland Engine Co., will attend to the four Gipsy Queen 70 engines.

The intention is to fly rapidly to New Zealand, taking advantage of the additional fuel carried in the two special fuselage tanks fitted for the Tasman Sea crossing. About two weeks will then be spent in New Zealand, followed by a month's demonstration flying in Australia. The return flight will follow much the same route, but will be made more slowly and may include some diversions in order to show the Marathon to everyone interested. Four days will be spent at Singapore around March 17th, two weeks in India and Pakistan about March 25th; and the same period in the Middle East during April.

For the production versions, a price of £43,000 ex-Woodley is envisaged. This will include the 18-seat layout (H.P.R.1. Spec.) but not radio or any special equipment. Forty Marathons have been ordered, and production has begun. A fully illustrated description appeared in *Flight* of May 19th, 1949.

B.E.A.'S NEW TARGETS

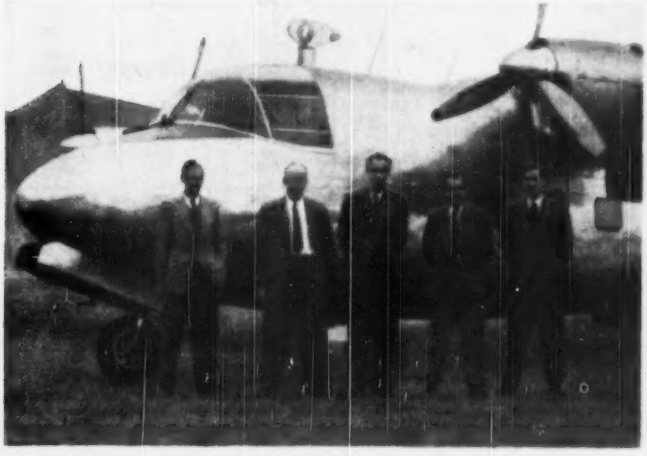
BRITISH European Airways' Christmas traffic beat all previous records in spite of adverse weather. During the holiday week, the Corporation flew 1,985 hours and covered 290,000 aircraft miles. Altogether, 10,900 passengers, 119 tons of freight and 160 tons of Christmas mail were transported—almost a 50 per cent increase on the figures for 1948.

In a message to B.E.A. staff, Mr. Peter Masefield (chief executive), says that although substantial progress can be expected in 1950 the corporation cannot hope to achieve a profit over the full year. The aim, however, is to reduce the deficit during the current financial year (which ends on March 31st) to one of £1,500,000. The previous annual deficit was £2,763,085.

In terms of passengers carried, B.E.A. now claims seventh place among the airlines of the world, the figure of 700,000 in 1949 being exceeded only by the six principal U.S. carriers. "Only three airlines in the world have a better staff/aircraft ratio (66.5) than B.E.A.," claims Mr. Masefield.

The Corporation aims to increase flying hours from 110,000 (planned for its operational year ending March 31st next) to approximately 140,000 in the following 12 months. The Viking fleet of 42 aircraft is budgeted to fly 78,000 hours, the Dakota fleet (33 aircraft) 50,000 hours and the 20 Rapides 12,400 hours.

Every extra hour which can be achieved above the 140,000 target will mean approximately £26 towards a profit, and the scheduled four hours per aircraft per day will bring in about £8,000,000 revenue. An indication of the corporation's progress is contained



COMMONWEALTH CRUISE: Representatives of three British Dominions are among the crew of the Marathon which, as reported above, is making a world sales tour. Left to right are Mr. R. C. Hobbs, engineer (South African), G/C. A. F. Bandidt, commercial manager (Australian), Mr. H. Kendal, chief pilot (Canadian), Mr. R. A. Constantine, radio navigator (English), and Mr. J. Parker, engineer (English).

CIVIL AVIATION NEWS . . .

in the report that the revenue of £405,900 during the month of November (normally the worst winter month for traffic) is, in fact, within £1,500 of the figure for the peak-traffic month of July, 1947. Operating costs, however, are said to be rising at a serious rate, owing to an increase of 5d a gallon for aviation fuel and the extra expense of running Continental stations since devaluation.

Of the planned move from Northolt to London Airport, Mr. Masefield says that the Northolt base will operate at full capacity at least up to the end of the summer of 1952. Thereafter there will be progressively less Viking and Dakota flying from the airfield as Ambassadors and Viscounts increase their operations from Heathrow. It is not expected that the move from Northolt will be completed before the spring of 1954.

ATLANTIC CHARTER SERVICES

IN the belief that regular airlines will be operating at or near full capacity this summer, C.A.B. has announced a policy which enables American charter firms to apply for permission to take part in transatlantic services between June 1st and September 30th, when particularly heavy traffic is expected. The Holy Year celebrations in Rome, the attraction of European countries with de-valued currencies and the general demand in America for foreign travel are the three factors on which the traffic expectations are based. Charter companies' applications to carry passengers, who must be members of *bona fide* educational, religious or charitable groups, must reach C.A.B. before March 1st.

One member of the Board has expressed the opinion that such operations will be uneconomical and will interfere with the tourist traffic attracted by the airline excursion rates already offered to American travellers in the period from January to March.

T.C.A. PROGRESS

ROUTE-MILEAGE of the Trans-Canada Airlines system now extends to over 16,000, serving some 40 communities in Canada, the United States, the United Kingdom and the Caribbean. A review of the company's 1949 activities shows that more than 690,000 passengers were carried during the year, an increase of 23 per cent on the 1948 figures. Cargo and express ton-mileage together exceeded 3,600,000, an increase of 55 per cent; and mail ton-miles reached a figure (3,900,000) which was almost double that of the previous year. These greatly increased loads were carried by a fleet (20 North Stars and 27 DC-3s) that had not appreciably increased in size.

With all classes of traffic the company flew over 84 million ton-miles (25 per cent more than in 1948)—during which approximately 1,000 crossings of the North Atlantic were made.

Although route-mileage did not greatly increase during 1949, important operational additions were made by the extension of certain routes to include further stopping-places. The Trinidad route, for example, was extended to Barbados and North Star services were extended to the cities of Edmonton, Saskatoon and Vancouver.

"The signing of revised bi-lateral agreements between

British Airways' Operating Statistics for September, 1949

(Figures for the corresponding period of 1948 are given in parentheses)

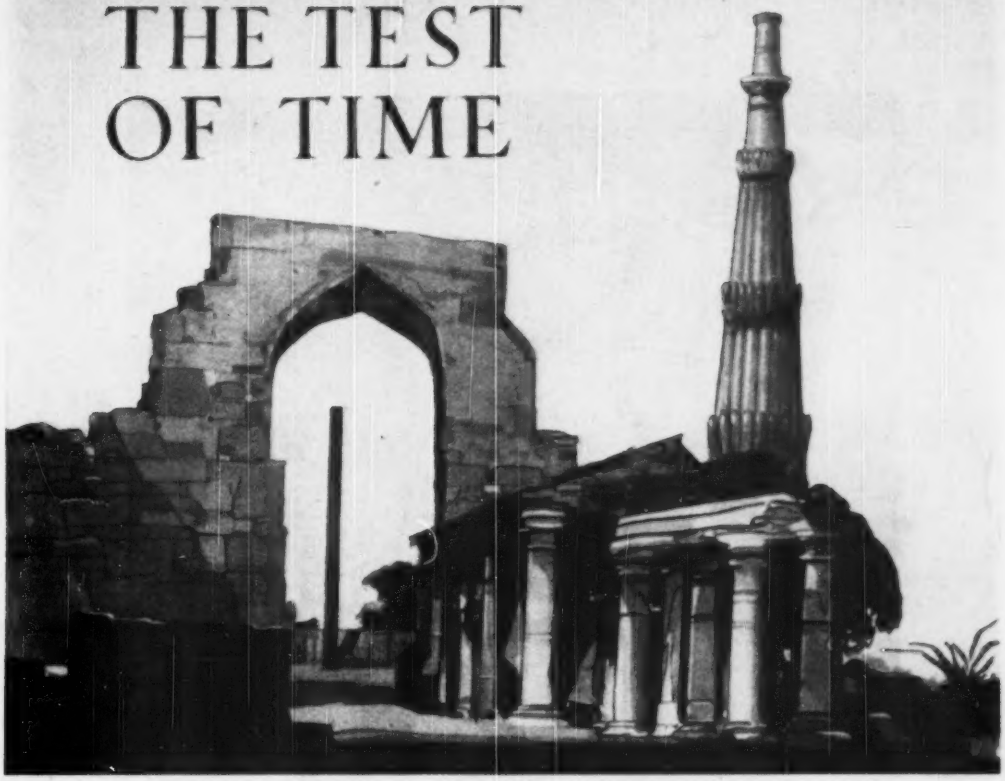
	B.O.A.C. All Divisions	B.O.A.C. Western Division	B.O.A.C. Eastern Division	B.O.A.C. South American Division	B.E.A. All Divisions	B.E.A. Continental Division	B.E.A. British Division
Total revenue aircraft-miles	2,389,476 (2,674,436)	322,413 (323,285)	1,638,693 (1,909,203)	398,380 (441,948)	1,569,119 (1,329,831)	991,227 (742,044)	577,892 (587,787)
Total aircraft-miles	2,677,784 (3,078,446)	376,394 (473,283)	1,893,558 (2,096,316)	427,842 (508,847)	1,598,361 (1,355,021)	1,006,764 (754,038)	591,597 (600,983)
Revenue passengers carried	13,512 (17,673)	3,463 (3,869)	8,937 (7,344)	1,213 (1,540)	90,780 (75,863)	37,141 (25,622)	53,639 (50,241)
Revenue passenger-miles	37,747,905 (38,522,506)	8,172,106 (8,987,710)	27,560,388 (24,919,390)	2,015,411 (4,615,406)	24,622,488 (19,152,560)	15,545,671 (11,623,939)	9,076,817 (7,528,621)
Available seat-miles	57,978,901 (55,559,859)	11,232,367 (13,571,939)	40,370,492 (33,792,528)	6,336,042 (8,195,392)	34,890,991 (25,973,259)	22,221,271 (15,321,514)	12,669,720 (10,651,745)
Revenue passenger load factor (per cent)	65.1 (69.3)	72.4 (66.2)	68.3 (73.7)	31.8 (56.3)	70.6 (73.7)	70.0 (75.9)	71.6 (70.7)
Cargo carried (ons): Mail	137.3 (143.6)	31.8 (25.0)	93.4 (103.4)	12.1 (15.2)	285.6 (238.2)	181.6 (138.8)	104.0 (99.4)
Freight	329.3 (288.3)	46.7 (47.5)	244.0 (201.8)	38.6 (39.0)	567.4 (491.1)	395.9 (380.9)	181.5 (110.2)
Total revenue load ton-miles	5,451,942 (5,380,251)	1,016,395 (1,081,665)	4,014,370 (3,576,445)	421,177 (742,121)	2,404,941 (1,904,469)	1,638,360 (1,277,059)	766,581 (627,410)
Total usable capacity ton-miles	9,693,735 (8,649,526)	1,635,205 (1,694,903)	6,705,799 (5,575,819)	1,352,731 (1,770,804)	3,739,279 (2,855,750)	2,572,571 (1,826,781)	1,166,708 (1,028,969)
Overall revenue load-factor (per cent)	57.4 (62.9)	63.6 (62.6)	61.3 (64.8)	31.1 (55.3)	65.0 (66.8)	64.1 (69.9)	67.1 (61.2)
Total revenue hours	12,009 (14,456)	1,441 (1,361)	8,797 (10,921)	1,771 (2,174)	10,715 (9,385)	5,901 (4,455)	4,814 (4,930)
Total non-revenue hours	1,945 (2,250)	178 (783)	1,213 (1,102)	454 (385)	229 (303)	100 (84)	129 (123)
Equivalent annual utilization (revenue hours) per aircraft	1,317 —	— —	— —	1,414 (1,303)	1,456 (1,527)	1,527 (1,725)	1,378 (1,385)
Unduplicated route-miles in operation at end of period	74,060 (91,975)	7,725 (8,523)	50,250 (58,565)	16,035 (24,887)	13,254 (12,984)	10,348 (10,435)	2,906 (2,549)
Percentage regularity	97.8 (99.4)	97.3 (99.0)	97.8 (99.8)	98.4 (98.1)	97.6 (96.7)	98.3 (98.2)	97.3 (96.2)
Average length of stage flight (miles)	1,007 (969)	1,092 (1,074)	1,001 (937)	969 (1,038)	198 (180)	351 (391)	116 (113)

THE number of passengers carried by the British Airways Corporations and by B.E.A.'s associated operators during September, 1949, showed an increase of 25 per cent on the figure for the corresponding month of last year; the total of 114,000 passengers was made up of 52,000 carried on international services and nearly 62,000 on internal services. Companies operating under associate agreements with B.E.A. carried 10,000.

Passenger-mileage increased by 10 per cent as compared with September, 1948, B.O.A.C. accounting for 38 million passenger miles and B.E.A.C. for 25 million. The B.E.A. figure included 16 million passenger-miles flown on continental services (an increase of 34 per cent on the same month in the previous year) and 9 million on internal services, an increase of 21 per cent. In the first six months (April to September) of the current financial year, 32 million revenue-load ton-miles were flown by B.O.A.C. (including the former B.S.A.A. routes)—slightly more than in the corresponding period of 1948. B.E.A.'s revenue traffic for the six months was 13 million load ton-miles, an increase of 34 per cent. Three-quarters of this traffic was carried on Continental services, where an increase of nearly 40 per cent was seen. Freight ton-mileage in both Corporations increased by over 16 per cent and the mail ton-miles flown by B.E.A. showed an increase of 22.5 per cent.

In consequence of the merger of B.S.A.A. with B.O.A.C. on August 1, 1949, current statistics for the routes formerly operated by B.S.A.A. are shown in the South American Division of B.O.A.C. and are included in the figures for all divisions of that Corporation.

THE TEST OF TIME



KUTB MINAR and the IRON PILLAR, Old Delhi.

This great memorial, considered to be the most perfect tower is 238 ft. high and built of red sandstone.

Within the forecourt of the Mosque is the enigmatic IRON PILLAR, erected A.D. 415. It stands 23 ft. high and weighs 6 tons . . . through all the centuries and extremes of heat and rain it has shown no sign of rust

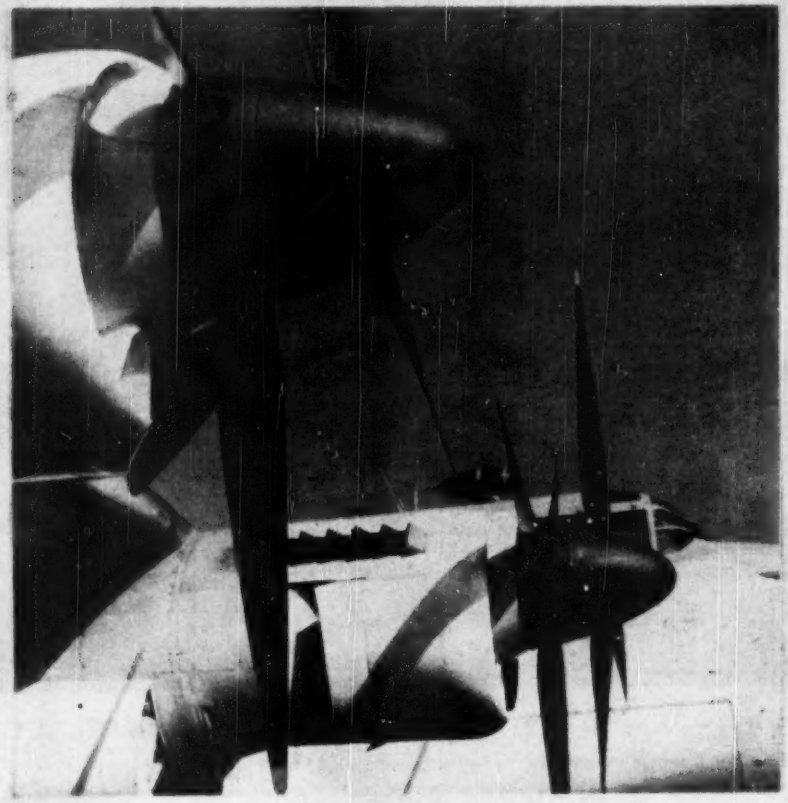
PERFECT DESIGN — FINEST MATERIALS AND UNEQUALLED WORKMANSHIP — all are proved by the TEST OF TIME

BALL & ROLLER R&M BEARINGS

Symbol of Endurance!

RANSOME & MARLES BEARING CO. LTD., NEWARK-ON-TRENT, ENGLAND

The choice of experience



The Avro Shackleton long-range reconnaissance bomber is fitted with de Havilland counter-rotating six-blade quick-feathering propellers

DE HAVILLAND

DH PROPELLERS

DE HAVILLAND PROPELLERS LTD., HATFIELD, ENGLAND

CIVIL AVIATION NEWS . . .

Canada, U.K., and the U.S. respectively, in 1949," continues the report, "has opened the way to further growth and strengthening of the nation's air services. These new understandings will have significance to T.C.A. in the North Atlantic and Caribbean areas and in operations between Canada and the United States.

It is hoped that the obstacles placed in the way of the expected T.C.A. service on the Montreal-New York route will soon be removed. Arrangements have also been made to obtain authorization for a T.C.A. traffic stop at Tampa, Florida, which will be a valuable addition to the airline's southern route.

AIR CHARTER IN 1949

RECENT summaries of the activities of British charter operators during 1949 indicate that 75 per cent of the operations were concerned with established markets, in the carriage of fruit, textiles, livestock, drugs, ship's spare parts and crews, emigrants, tourists and organized parties in the entertainment field.

The year has been a particularly difficult one, in which economic upheavals, labour difficulties and political crises have all contributed to impede the expansion of the charter business. A large proportion of the charters negotiated were given to foreign operators, who were usually able to offer more suitable long-range aircraft.

BREVITIES

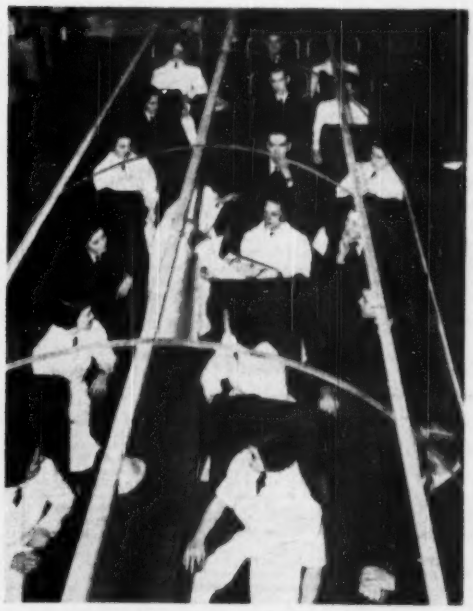
IT was announced on January 11th that final agreement had been reached between B.A.L.P.A. and B.A.C.A. on the terms and conditions of service for commercial pilots. The agreement is effective from January 1st.

* * *

Sabena is to open a new 10,200-mile route from New York to Johannesburg with Brussels, Rome and Lydda as intermediate stops. The service, expected to be "one of the fastest in the world," is to be flown with 52-seater DC-6s operating initially on a weekly schedule.

* * *

New Air France services to Germany started on January 5th. Following a ten-day proving period, thrice-weekly Frankfurt-Berlin services are being flown and the new service from Paris to Munich and Berlin has also started. In addition, there is now one return Munich-Frankfurt-Berlin service per week. The company also announces that in conjunction with a French charter firm a fortnightly Liberator service has been inaugurated between Paris and Caracas, with an intermediate Cayenne.



STRATOSTEWARDRY: In preparation for the opening-up of further routes which the delivery of new aircraft will make possible, B.O.A.C. is training a further 70 hostesses. A number of trainees—pictured above catering for the foibles of "passengers"—are already undergoing the 11-week course with the aid of a cabin mock-up at Heston.

The American Aircraft Industries' Association reports that, during 1949, only 5,400 private aircraft were built, as compared with 7,059 in the previous year; the number of commercial transports decreased by 95 to 165.

* * *

Trans-Australian Airlines operated 547 special flights during Christmas and the New Year, in addition to its scheduled services. The extra flights provided seats for 11,788 more passengers.

* * *

As a result of British recognition of the Chinese Communist régime at Peking, Major-General Chennault's civil air transport organization has suspended air services between Hong Kong and Formosa.

* * *

Trans-Canada Airlines announce the appointment of Captain H. W. Seagrim, previously director of flight operations, to the new post of general manager, operations. The new director of flight operations will be Captain J. L. Rood, who flew Canada's first Lancastrian on the transatlantic route in 1943.

* * *

The annual report of P.A.W.A. shows that approximately 61,400 passengers were flown to and from Europe in 1949, an increase of 5,400 on the figure for the previous year. The company's Atlantic division made 2,729 flights, an average of more than six a day; some 317,400,000 passenger miles were flown. South American traffic amounted to 120,190 passengers.

* * *

During the Christmas fortnight, in which considerably increased frequencies were scheduled by Australian airline operators, traffic at Essenden and Maxcot amounted to almost 200 movements daily. On Christmas Eve, 122 crossings were made between Melbourne and Tasmania. By comparison, peak daily traffic at Northolt Airport was in the region of 150 movements per day.

* * *

Under the terms of a new associate agreement with B.E.A., Morton Air Services have been granted permission by the M.C.A. to operate four new scheduled services from Bristol—to Cardiff, to the Isle of Wight, to Guernsey-Jersey, and to the Isle of Man. Operations on the Bristol-Cardiff route are expected to begin this month: in the tentative schedule two return flights will be made daily, Sundays excepted. On the Guernsey-Jersey service, five flights will be made on Saturdays. The company's fleet include Airspeed Consuls and D.H. Rapides and Doves.

* * *

The Ryan Aeronautical Company announces production of a new utility-model Navion in addition to the Lycoming-powered "Super 260," initial production of which is expected in March. The price of the utility model, which is powered by the 205-h.p. Continental engine, is $9,485. The only differences between this aircraft and the normal "de luxe 205" ($10,985) are seen in the accessories and interior furnishings; the most important refinement on the latter is the installation of manually-controlled cooling-air outlets.

* * *

The U.S. Civil Aeronautics Administration has approved for commercial use the most powerful jet unit now in production in America—the J-47 (otherwise known as the TG-190) made by the General Electric Corporation. The unit delivers 5,200-lb thrust (equivalent to 5,200 h.p. at 375 m.p.h.). The company points out that, in Britain and Canada, jet transports are now in production and says that the Administration's approval of the American unit clears the way for its installation when American jet transports progress beyond the drawing board stage. The J-47 is at present used

CIVIL AVIATION NEWS

in the F-86 fighter, the B-47 Stratojet bomber and other military aircraft.

* * *

In order to meet the demand for additional capacity from India to Rome, the B.O.A.C. Argonaut service between London and Calcutta with January 19th call at Rome instead of Malta.

* * *

The Australian Minister of Civil Aviation has announced the signature of the projected air agreement between Ceylon and Australia. For a trial period each airline will have the right to operate a monthly DC-4 flight or its equivalent. The agreement provides for Ceylon to operate from Colombo to Sydney *via* intermediate points and for Australia to fly its U.K. services *via* Ceylon.

* * *

Following the recent suspension of rail and river traffic by Pakistan, five Indian airlines are flying freight to Assam and Tripura states. In ten days the airlines carried a million pounds of jute and two million oranges to Calcutta, returning with 1,200,000lb of miscellaneous supplies for the two states.

* * *

All American Overseas Airlines transatlantic services are now being operated from Idlewild instead of La Guardia, from which the company's last scheduled flight was made on January 9th; it was the 19,522nd transatlantic crossing since the airline commenced these services in the summer of 1942.

* * *

Meeting recently at Taormina (Sicily) for the sixth session of the I.C.A.O. Juridical Committee, representatives of thirty nations discussed the problems of third-party risks and the responsibility of aircraft owners.

* * *

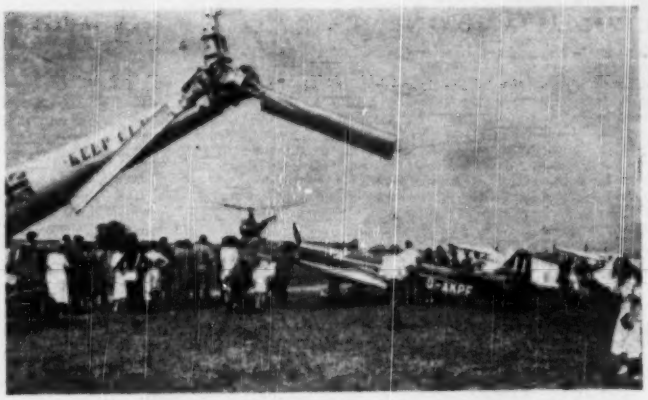
S.A.S. announce that free coach transport is now available between Renfrew and Prestwick (and *vice versa*) by previous arrangement with their offices at either place. The company hopes that this facility will result in increased bookings to New York and Copenhagen, Oslo and Stockholm by its DC-6 services.

* * *

The Air Registration Board announces the issue of *Notices to Licensed Aircraft Engineers and to Owners of Civil Aircraft* Nos. 2, 4 and 10. Subjects dealt with are respectively, Supervision of Licensed Aircraft Engineers, Airscrews Approved for use on Civil Aircraft, and Rating and Categories of Engineers' Licenses.

* * *

A new "air-coach" service is to be operated between Los Angeles, Chicago and New York. Seventy passengers will be carried in each aircraft, and the service comprises daily return flight to New York, a distance of approximately 3,000 miles. Fares for the complete route will be $110 (£39); from Los Angeles to Chicago they will be $85 (£30) and from Chicago to New York, $35 (£12).

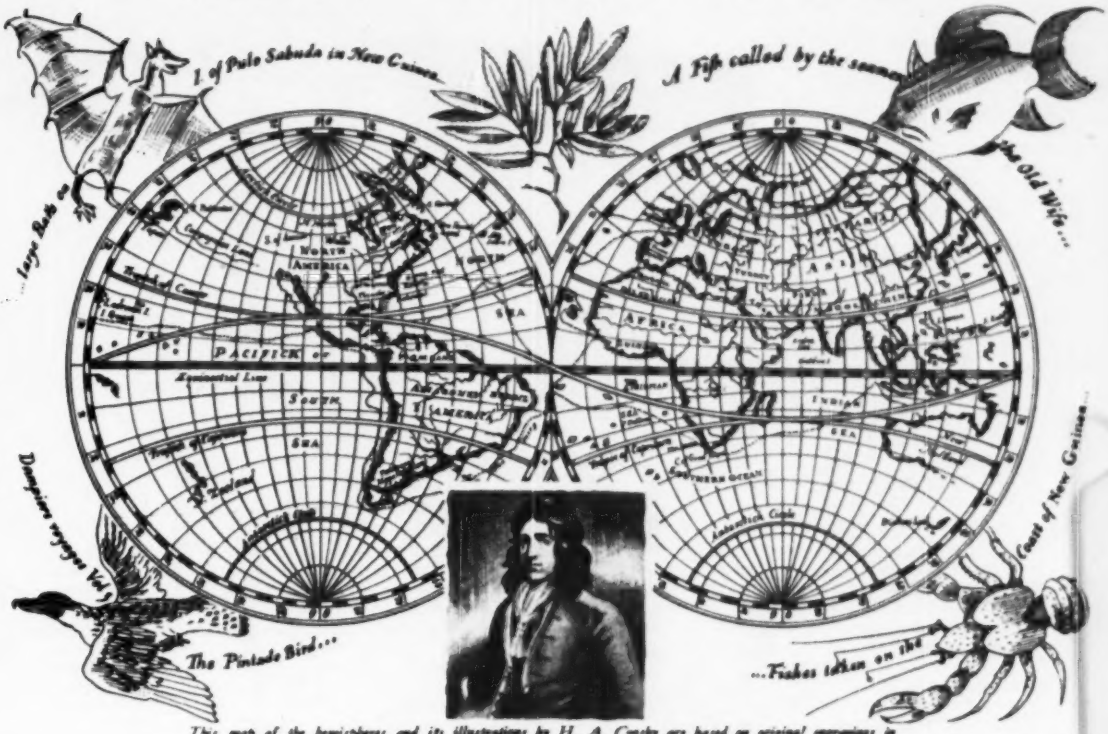


SUMMER SOUVENIRS: Memories of last summer's many successful meetings are recalled in this view of the competitors' park at Thruxton—home of the Wiltshire Flying Club—on the occasion of the race meeting in August.

FORTHCOMING EVENTS, JANUARY—JUNE

Jan.	19.	R.Ae.S. Section Lectures: "Acoustical Aspects of Recent Aerodynamic Research." (joint symposium with Acoustics Group of the Physical Society).
Jan.	20.	London Aeroplane Club: Annual Dinner Dance.
Jan.	24.	R.Ae.C.: "Air Travel through the U.S.A." film by William Courtenay, O.B.E., M.M. (At Londonderry House.)
Jan.	25.	R.Ae.S. (Reading): "Redux Bonding of Aircraft Structures," by C. J. Hoot, B.Sc.
Jan.	26.	Helicopter Association: "Pest Control and the Helicopter," by W. E. Rippon.
Jan.	31.	R.Ae.S. Section Lecture: "Further Problems of Aircraft Screening," by J. H. Argyris, A.F.R.Ae.S.
Feb.	1.	Royal United Service Institution: "Aircraft for Army Uses," by Lt.-Gen. R. N. Gale, C.B., D.S.O., O.B.E., M.C.
Feb.	4.	British Interplanetary Society: Discussion—"Effects of Interplanetary Flight."
Feb.	8.	R. Ae. S. (Brough): "Rocket Propulsion and Inter Planetary Flight," by A. V. Cleaver, A. R. Ae. S.
Feb.	9.	R.Ae.S.: "Producing a Prototype Aircraft," by C. T. Wilkins, A.F.R.Ae.S.
Feb.	15.	Institute of Transport: Brancker Memorial Lecture—A.V.-M. D. C. T. Bennett, C.B., C.B.E., D.S.O.
Feb.	16.	R.Ae.S. Section Lecture: "Prototype Testing," by D. R. H. Dickinson, A.F.R.Ae.S.
Feb.	17.	Institute of Navigation: "Air Traffic Control," a symposium of papers.
Feb.	21.	R.Ae.S. (Belfast): "Strength-testing of Aircraft," by Dr. P. B. Walker, M.A., Ph.D., F.R.Ae.S.
Feb.	21.	R.Ae.S. Section Lecture: "Air-Intake Design for High-speed Aircraft," by Dr. I. Seddon, B.Sc.
Feb.	22.	R.Ae.S. (Reading): "Propeller Turbines," by A. C. Clinton, F.R.Ae.S.
Feb.	23.	R.Ae.S. Graduates: "Problems of Heat Transfer," by W. R. Shaory, B.Sc., Grad. R.Ae.S., and J. Rivers, Grad. R.Ae.S.
Feb.	25.	Helicopter Association: "French Helicopter Development," by Col. R. M. Garry.
March	1.	R.Ae.S. (Weybridge): "Do Scientists Know Anything?" by C. G. Grey, F.M.R.Ae.S.
March	1.	R.Ae.S. Graduates: "Engineering Problems of Aircraft Design." (Joint meeting with I.E.E. and I.M.E. graduates.)
March	2.	R.Ae.S.: "Design for Maintenance," by R. G. Bishop, F.R.Ae.S.
March	4.	British Interplanetary Society: "Testing of Rocket Motors," by Dipl. Ing. H. F. Zumpe.
March	7.	R.Ae.S. Graduates: "Gas-turbine Installation," by J. C. Wallin, B.Sc., A.F.R.Ae.S.
March	8.	R.Ae.C.: Ball, Londonderry House.
March	14.	R.Ae.S. (Belfast): "Problems of High-speed Flight," by H. Davies, M.Sc., F.R.Ae.S.
March	16.	R.Ae.S.: "Air Survey," by G.C. F. C. V. Laws, C.B., C.B.E.
March	17.	Institute of Transport: Annual Dinner.
March	21.	R.Ae.S. Section Lecture: "Boundary Layer at High Speeds," by A. D. Young, M.A., F.R.Ae.S.
March	24.	College of Aeronautics Senior Common Room Society: Annual Dinner.
March	25.	Helicopter Association: "Performance Testing of Helicopters," by F. O'Hara, M.A.
March	28.	Institute of Transport (Metropolitan Graduates): "Post-war R.A.F. Developments and their Effects on Civil Aviation," by A. J. Allum.
March	28.	R.Ae.S. Graduates: "Undercarriage Design and Testing," by G. S. Cranwell, Grad. R.Ae.S.
March	30.	R.Ae.S.: "Testing Aero Engines and Power Plants," by A. C. Lovesey, O.B.E., B.Sc., F.R.Ae.S.
April	1.	British Interplanetary Society: "Space Travel—Fact and Fiction," by A. C. Clarke, B.Sc.
April	5.	R.Ae.S. (Brough): "Flying-boat Design Problems," by H. Knowler, A.M.I.C.E., F.R.Ae.S.
April	8.	British Interplanetary Society (Manchester): Film Show.
April	12.	R.Ae.S. (Reading): "Flying Boats," by H. Knowler, F.R.Ae.S.
April	13.	R.Ae.S.: "The Berlin Air Lift," by A. Cdre. J. W. F. Merer, C.B.
April	18.	Institute of Transport: Informal Luncheon. Speaker: Sir Miles Thomas, D.F.C.
April	18.	R.Ae.S. Graduates: "Training of Aeronautical Engineers." (Discussion; chairman, Marcus Langley, F.R.Ae.S.)
April	25.	R.Ae.S. Section Lecture: "Flight Refuelling and the Problem of Range," by C. H. Latimer Needham, M.Sc., F.R.Ae.S.
April	27.	R.Ae.S.: "High-speed Research in the Aerodynamics Division of the N.P.L.," by J. A. Bevan, M.A. (Cantab.), A.F.R.Ae.S., and D. Holder (of Manchester).
May	4.	R.Ae.S.: Third Louis Blériot Lecture, by Sir Frederick Handley Page, C.B.E., F.I.Ae.S., Hon. F.R.Ae.S. (in Paris).
May	25.	R.Ae.S.: 38th Wilbur Wright Memorial Lecture, by Sir Richard Fairey, M.B.E.
May	28-29.	Bembridge and Sandown Aero Club: Rally.
June	3-4.	Ultra Light Aircraft Association: Rally.
June	4.	F.A.I.: General Conference, Stockholm.
June	10.	Darlington Flying Display.
June	10.	Yorkshire Aeroplane Club: International Rally, Sherburn-in-Elmet, Leeds.
June	10-25.	Brussels International Aeronautical Exhibition.
June	15-18.	Benelux Air Tour.
June	17.	Wolverhampton Aero Club: King's Cup Race.
June	17-18.	Normandy Rally.
June	24-26.	Le Touquet Rally.

FOLLOWING THE GREAT EXPLORERS


...Large Rats as I of Pulo Sabuda in New Guinea
A Fish called by the Seamen the Old Wife...
Dampiers voyage Vol. I
The Pintado Bird...
...Fishes taken on the Coast of New Guinea

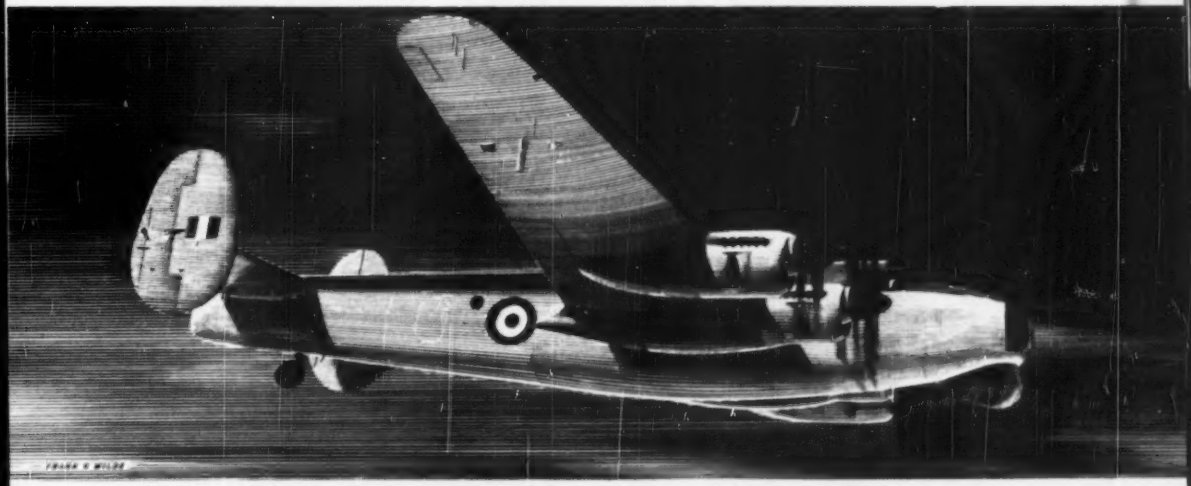
This map of the hemispheres and its illustrations by H. A. Crosby are based on original engravings in William Dampier's "A New Voyage Round the World" published in 1697

"A New Voyage round the World"

by WILLIAM DAMPIER

Although it took William Dampier twelve years to buccaneer his way round the world he had the true spirit of reconnaissance. A born navigator, he established an unrivalled reputation for the accuracy of his descriptions. He made his voyages at the end of the 17th century when the accuracy of his navigational aids left much to be desired.

How much better off would he have been as captain of the new Avro Shackleton, designed and equipped to range the seven seas.



AVRO Shackleton

NOW IN QUANTITY PRODUCTION FOR COASTAL COMMAND, ROYAL AIR FORCE

A. V. ROE & CO. LTD. MANCHESTER · BRANCH OF THE HAWKER-SIDDELEY GROUP

Terry's have often been described as "The Gateway to knowledge of springs and presswork." It is at their great factory at Redditch, devoted entirely to the design and manufacture of these and kindred products, that the most intensive and advanced research has been undertaken during the last century into this specialised field of engineering. Most of the highly complex spring and presswork parts, which have been required to meet the exacting demands of modern engineering techniques, have been evolved here. Today Terry's, with their vast store of accumulated experience, are better placed than anyone to solve new spring and presswork problems as they arise. If *you* want reliable advice, turn to Terry's

WEST GATE, WINCHESTER

West Gate, a narrow archway at the top of the High Street, marks the line of the ancient city wall. This massive structure is now fitted up as a museum and contains, among other interesting relics, the city coffer and a valuable collection of weights and measures including the Winchester Bushel, made by order of Henry VII in 1485-6.

TERRY'S *the gateway to knowledge of* SPRINGS & PRESSWORK

HERBERT TERRY & SON LIMITED, REDDITCH, ENGLAND

RADIO FOR LIGHT AIRCRAFT

The Private Owner and the New Regulations : Equipment to Meet Requirements

THE ARTICLE in the following pages, a factual review of light-aircraft equipment either available to-day or approaching the production stage, is preceded by a commentary written by members of the staff of *Flight* who, like other light-aircraft users, are preparing themselves to meet the difficult situation which the new regulations—intended primarily as a safety measure—have introduced. The fact that these comments are in somewhat lighter vein should not be taken to indicate that *Flight* considers the subject lightly : on the contrary, the intention is to help other private pilots, together with "small" charter operators and those who use light aircraft on their business.

To regain his old freedom to fly almost anywhere at almost any time, a private pilot must now equip his aircraft with radio costing anything from £150 to £400, and must himself pass a stiff written and practical test for an Instrument Rating. In addition, he must pass a simpler test for the licence to operate his radio.

The review of communications and navigation equipment which comprises the second section of the article has been prepared by Dr. B. O'Kane of International Aeradio, Ltd., who are in a position to give advice and further details concerning both airborne and ground sets ; their address is Bovingdon Airport, Hemel Hempstead, Herts, and they have a London office at 40 Park Street, W.1.

THE PILOT'S PART

DURING the coming months private pilots and small charter operators will find their flying more and more curtailed by the weather—that is unless they are able to comply with the new comprehensive regulations covering radio equipment and personal licences. However much we may regret the fact that our freedom of the air is thus restricted still further, we must admit, without hesitation, that safety is of paramount importance and therefore acknowledge that, when Instrument Flight Rules are in force, only those pilots who are competent and properly equipped to cope with the conditions should be allowed to fly.

The many small operators in the Home Counties will feel the restrictions most because of the large area and numerous airfields covered by the London Control Zone.

Radio and instrument rating requirements will not apply in clear weather, or in poor weather in areas remote from air lanes and commercial airports, but they affect all the controlled areas around London and other large cities when QBI is in force and I.F.R. conditions accordingly prevail. They apply automatically to the hours of darkness.

The various new regulations will come into force by degrees in ensuing months, but certain details will no doubt be subject to modification following experience and upon the introduction of the Airways Plan late in the year. The height zones superimposed upon the London zone proper are an indication of how a little more freedom can be given without prejudicing the provisions of a control zone.

Most amateur pilots, even with a Service background, find the Instrument Rating tests stiff—a fact which doubtless accounts in part for the small numbers who have applied to take them to date ; even so, some professionals feel that they are not stiff enough, though they are already rather harder to pass than their R.A.F. green-ticket counterpart. Some hours on a Link trainer may be the answer to the problem of becoming conversant with the latest procedures.

A possible compromise might lie in maintaining a reasonable standard for all pilots who on occasions need to fly under I.F.R. conditions, which are often of the "technical" type, but excluding them entirely from the immediate area of the main international terminals and corridors when QBI is in force. In these circumstances only professional airline pilots and those with equally high standards and experience would be encountered in the air during the "busy" periods of a bad-weather flight.

The light-aircraft pilot who has never used airborne radio may regard it as an expensive luxury which he would rather do without. Even the wartime pilot who remembers the excellent service he received from his 1196 or 1143 V.H.F. set in return for an action no more complicated than pressing two buttons may now view a small civil set in a small private aircraft with distinct reserve. In wartime it seemed that one had a right to all kinds of facilities for the asking, whereas in the commerce-filled air of to-day one sometimes feels reluctant to get on the air in competition with instructions to a Stratocruiser landing at one large airport, or to bother a busy Flying Control at another.

It does not, however, require more than an hour or two in the air, using a V.H.F. radio alone, to realize its several advantages—quite apart from the fact that the use of such equipment is now compulsory under certain weather conditions. Most controllers on the ground manage to convey the flattering impression that one man approaching the airfield in an Auster, being the pilot of an aircraft in the air, is just as important as a York full of V.I.Ps.

Moreover, flying-control staffs at airfields very quickly

RADIO FOR LIGHT AIRCRAFT . . .

make it clear that so long as a pilot plays the game they will readily give him all possible help and, if need be, stretch the rules almost to breaking-point to accommodate him. They are fellow airmen, at least at heart, and by no means behave as the representatives of impersonal officialdom.

Apart from the circuit, landing and taxying instructions so useful at a strange field, the weather information always available and the help in the form of QDMs, visual signals, lighting and so forth that can be requested, a pilot with radio ceases to feel alone when flying solo, however miserable the trip he has to make. There is real comfort in the knowledge that, if weather or darkness descend at an inconvenient time, there is little real danger provided one's instrument flying is sound and while QDMs (and, in emergency, a G.C.A.) is available.

Language is less of a problem when flying abroad than might be imagined; the majority of controls have English-speaking operators and, for example, in Holland and almost to the same degree in Sweden, English is used as the standard language over the air. Its use at all major airports is by international agreement.

One problem which may be experienced both at home and abroad is the memorizing of a string of conditions given in answer to a request for landing instructions. If the instructions—clearly received—do not happen to be wholly necessary because weather is good and procedure obvious, "Roger" is an adequate reply. But if it is desirable to repeat them all for a check on accuracy, many pilots find it best to jot down the wind, runway, QFE and the rest on a pad kept in a convenient place for the purpose; thus they can read them back and then use them with confidence.

The first time one listens-out on an aircraft V.H.F. set one probably hears a baffling cacophony of crackles, peeps and distorted words, usually with background talk in a very masculine American accent. The term "listening-in," introduced at much the same time as station 2LO, is not now in common usage, but in the air "listening-out" means listening-in, unless one says "listening-out" at the end of a conversation over the air, in which case it means one has stopped listening—if you get our meaning. The immediate impression of the noise is that one will never be able to understand more than the odd word. In fact, however, one soon becomes adept at listening to the right things, particularly after some experience has shown what is to be expected. Additionally, there is a mysterious thing known to radio technicians as a "carrier" (no connection with paper bags or air transport companies) which conveniently damps out most of the background noises while one is receiving a message.

To avoid unnecessary chatter on the hard-pressed channels, a standard procedure is laid down for routine occurrences, and this, in question-and-answer form, is contained in the M.C.A. Communications Handbook. Emergency and distress action is also explained.

The new pilot operator (who, incidentally, is required to hold a licence) is recommended to read the printed instructions, have a talk with the local flying-control people, and learn the approved phonetic alphabet. In addition, he should talk normally into his microphone, pitching the voice as high as is comfortable, and remember "*fife*" (not faiv or foiv), "*niner*" (not nain or noin) and "*zero*" (not oh, ought or nought).

WHAT THE RADIO INDUSTRY OFFERS

BY this time private pilots will have realized the full implications of the Air Navigation (Radio) Regulations, 1949. Of particular importance is Section III ("Compulsory Carriage in Aircraft of Radio Apparatus and Licensed Operators"), which says, *inter alia*:—

7.—(1) Subject to the provisions of paragraph (3) of this Regulation and the proviso to Regulation 9:—

A.—No aircraft shall carry out a flight in any of the circumstances specified in (*a*), (*b*) and (*c*) of this sub-paragraph unless (i) the aircraft is equipped with radio apparatus for the sending and receiving of messages, and (ii) the requirements in respect of the carriage of licensed flight radio operators specified in Regulation 8 are complied with;

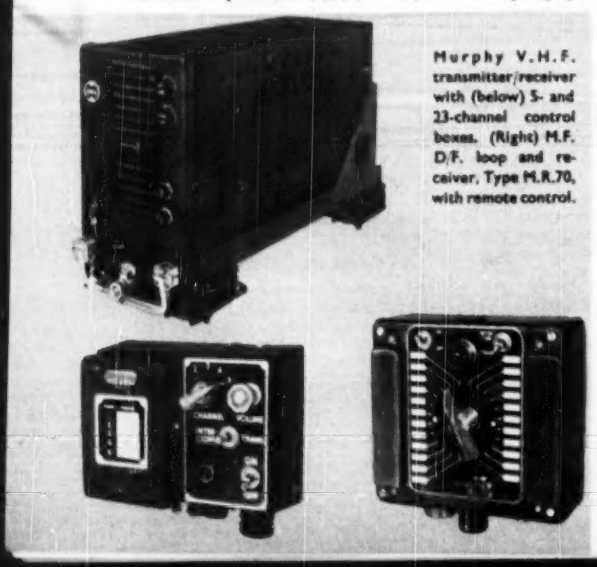
(*a*) Flight in circumstances which require the aircraft to communicate by radio with Air Traffic Control in order to comply with the Rules of the Air in Schedule II to the Order . . .

B.—No aircraft shall carry out a flight in any of the circumstances specified in (*a*), (*b*) and (*c*) of this sub-paragraph unless, in addition to the requirements in sub-paragraph A of this paragraph, the following requirements are also complied with . . .

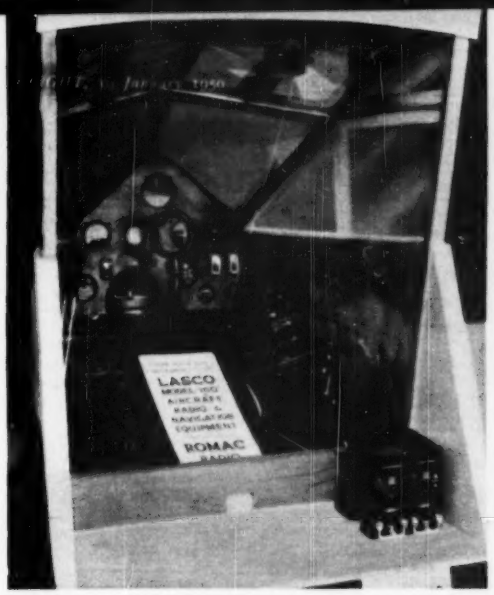
(*c*) in the case of flight in circumstances which require the aircraft to comply with the Instrument Flight Rules in Schedule II to the Order, the aircraft shall also be equipped with radio navigation apparatus.

In plain English, this means that in our climate it is necessary on most days of the year to load up with a certain amount of radio equipment before the aircraft can leave the ground. It is the author's purpose, in the following notes, to outline the equipment now on the market and describe the main characteristics of each. Communications and navigational aids are, so far as is practicable, dealt with separately.

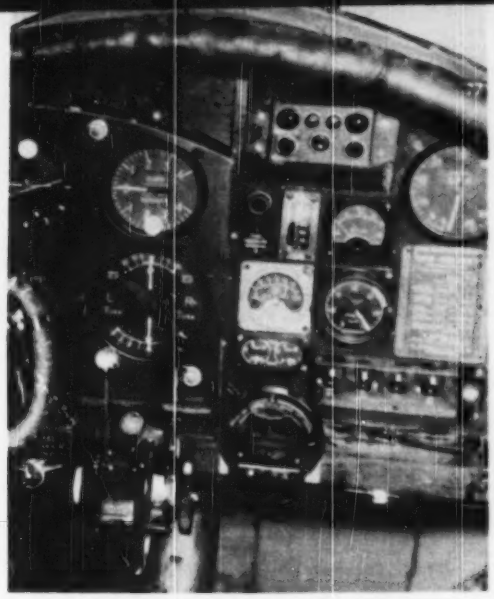
Communications.—The increasing use of V.H.F. for control purposes has led several manufacturers to produce transmitter/receivers suitable for light aircraft. These



Murphy V.H.F. transmitter/receiver with (below) 5- and 23-channel control boxes. (Right) M.F. D/F. loop and receiver, Type M.R.70, with remote control.



Romac Model 160 R/T and navigation installation for a Rapide.



Ekco control box mounted in a Proctor instrument panel.

range from a single- to a six-channel set. There are two sets with a greater number of channels—one with eleven (Ekco CE 40) and the other with 23 (Murphy MR 80)—which might be regarded as outside the scope of private users. In operation one channel may be set up on the universal guard and the others on the common approach and airfield-control frequencies. These frequencies will still be guarded even when the multi-frequency plan is implemented so that the smaller sets will not become obsolete.

Typical of these sets is the Murphy five-channel MR 60, which consists of a basic transmitter/receiver unit, which can be stowed away in the fuselage, and a controller for mounting near to the pilot. This control unit contains the crystals for transmission and reception, the channel-selection switch, volume control and on-off switch. All that is necessary to change channels is to turn the selector switch. Additional frequencies can be set up by inserting the appropriate crystals, no lining-up being necessary, as it is pre-set.

The power output is 1½ watt, which should be adequate for ranges up to 50 miles or more (depending on altitude) and the receiver sensitivity is high enough for two-way communication at these ranges. Power consumption is 100 watts. The transmitter/receiver unit fits into the standard R.C.E.E.A. racking and the complete installation, including aerial, headset, microphone and interconnecting cables, which are all supplied, weighs approximately 20 lb.

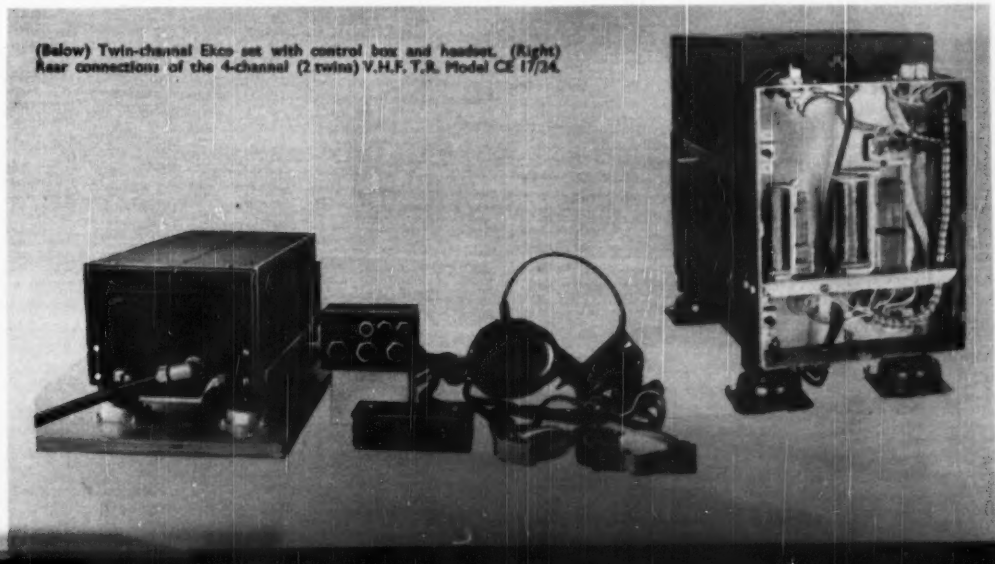
If the aircraft is not already screened it will be necessary to fit a new ignition harness to avoid interference. On some aircraft the magnetos may have to be replaced by a screened type. These items are not normally supplied by the set manufacturer but by the firm carrying out the installation.

Another interesting set is the Plessey six-channel PTR 61. In this, changing from one channel to another requires two operations, selection of the channel required and tuning-up. The latter operation is extremely simple, as a tuning meter is incorporated in the main unit or in the remote controller (if fitted). It is only necessary to depress the spring-loaded tuning knob and turn for maximum reading. The same procedure applies if crystals for other channels are inserted. If the set is mounted in the instrument panel, as will often be the case, crystals can be changed in flight. A feature of the Plessey set is the low consumption in the receiving position, namely, 55 watts. Ranges up to 78 miles have been recorded.

The Ekco CE 17 and CE 17/24, two-and four-channel sets, have been in production for some time and are fitted to some 400 aircraft. Their CE 40 is an eleven-channel set with an average power consumption of only 50 watts. A complete installation weighs about 29 lb.

Standard Telephones and Cables produce the STR9, which has now been modified to provide ten channels, and the STR12 with 23 channels. These, in a rather different class, are more expensive than others described here.

The use of MF for communication purposes is giving



(Below) Twin-channel Ekco set with control box and headset. (Right) Rear connections of the 4-channel (2 twins) V.H.F. T.R. Model CE 17/24.

RADIO FOR LIGHT AIRCRAFT . . .

place to V.H.F. and the main application is now for navigation—apart from listening to the B.B.C. Unless long-distance flights outside the United Kingdom are contemplated, it should not be necessary to carry H.F. equipment. If it is required, however, some details of suitable sets can be obtained by reference to articles in *Flight* of April 28th and September 22nd, 1949. A typical example in the Marconi AD97/108, which is fitted as standard in a number of aircraft. Over 200 Doves have been so equipped.

Navigational Aids.—Although such equipment does not comply with the Air Navigation Regulations, a pilot in an aircraft fitted with a V.H.F. transmitter/receiver can, by using the ground V.H.F. D/F. organization, obtain navigational assistance.

By the generally accepted meaning of navigational aids, the equipment suitable for light aircraft—and their owners' pockets—is not very extensive. For long-range navigation the Ferranti Consol receiver, FER 11, is of technical interest in that it operates off the 24-volt battery power supply with no additional power unit, the circuit being so arranged that the valves work with 24 volts H.T. Consol is particularly useful if long over-water flights are involved, where the aircraft may be out of range of other facilities. The set is also designed to receive radio-range signals and met. broadcasts. Pilots who are also yachting enthusiasts may find this set useful to them in—or on—another element. The equipment measures only 8in x 4in x 4in, weighs 3¼ lb and consumes 18 watts.

The most common aid at present in use, and probably for many years to come, is the M.F. beacon—which may be a broadcasting station. Although automatic radio-compasses such as the Marconi AD7092 are fitted to larger aircraft, these may be too expensive for the average private flier. The Murphy manual M.F. D/F. MR 70 is available as an alternative and will provide similar information. The loop is rotated by hand and bearings taken aurally. The loop can also be set and homing to the beacon carried out by using the visual indicator. The power consumption is 45 watts and the total weight of the installation, including the loop and loop-housing, is approximately 20 lb.

Having navigated successfully to his destination, the pilot may now have to descend through cloud. Assuming that no G.C.A. is available to talk him down, he must either let down on the radio range (if it is fitted), on a V.H.F. bearing or on one of the instrument approach systems. At present the only I.L.S. sets going into production are rather costly, having been designed for the scheduled operators' requirements and there is thus only S.B.A. to fall back on, figuratively speaking.

The Marconi Company make a miniature S.B.A. receiver, the AD86. The total weight of a complete installation is under 18 lb and the power consumption is 45 watts. A marker receiver is incorporated.

Marker beacons on the airways system operate on 75 mc/s. Surplus American marker receivers have been available, but Aeronautical Radio Services have now developed a receiver for 38 and 75 mc/s.

It is hoped that, by the time S.B.A. is superseded by I.L.S., sets suitable for light aircraft will be available.

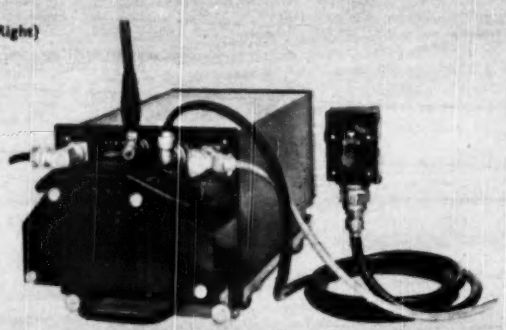
Equipment providing both communication and navigational-aid facilities is made by Romac and a similar set is under development by Aeronautical Radio Services. These sets, which are not yet type-approved, combine S.B.A. and M.F. D/F. receivers and V.H.F. transmitter/receiver; the former make has 12 channels and the latter 11. An S.B.A. marker receiver is also available. The overall dimensions of the Romac sets are approximately 13in x 7in x 9in and the total weight is approximately 28 lb. The power consumption (all facilities) is 100 watts. The advantage of these latter sets is that all the facilities—if required—are combined in one neat installation.

It is not intended to give exact prices of each type of equipment as details of these figures can be obtained from the manufacturers or their agents. One of the five- or six-channel V.H.F. sets would cost about £150 to £200 and the installation about another £30 to £40, apart from any charges for ignition harness or special work. The navigational aids vary in cost but a comprehensive installation of communications and navigational aids might be obtained for about £400 to £500, the combined equipments being somewhat cheaper.

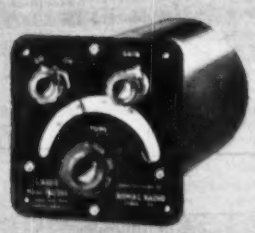
Maintenance costs would be of the order of ten shillings per man-hour plus the cost of any spares required.

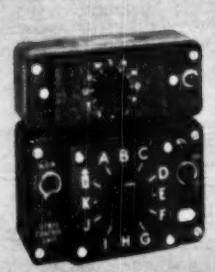
Names and addresses of firms making equipment

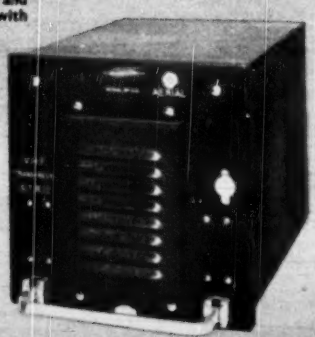
(Below) Controller for the Romac V.H.F/M.F. Model 160. (Right) Standard Telephones S.T.R.9 set with remote control.



(Below left) Romac S.B.A. controller and (right) S.T.R.12 V.H.F. T.R. with control box.







suitable for light aircraft, as described above, are:—

Aeronautical Radio Services, Ltd., Blackbushe Airport, nr. Camberley, Surrey; E. K. Cole, Ltd., Ekco Works, Southend-on-Sea; Ferranti, Ltd., Hollinwood, Lancs; General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2; Marconi's Wireless Telegraph Co., Ltd., Marconi House, Chelmsford; Murphy Radio, Ltd., Welwyn Garden City, Herts; The Plessey Co., Ltd., Vicarage Lane, Ilford, Essex; The Romac Radio Corporation, The Hyde, N.W.9. (Land, Air and Sea Instruments Co., Ltd., Grand Buildings, Trafalgar Sq., London, W.C.2); Standard Telephones & Cables, Ltd., Connaught House, 63, Aldwych, London, W.C.2.

There are a number of firms with facilities for carrying out installation work and obtaining approval, and in many cases, manufacturers have appointed official agents for sales and installation.

Finally, we may add a further extract from the regulations:—

"... The aircraft shall carry at least one licensed flight radio operator qualified under the terms of his licence to operate, for the sending and receiving of morse or spoken messages, the radio apparatus with which the aircraft is equipped."

The following Ministry of Civil Aviation pamphlets are concerned with radio operation, licences and instrument rating tests:—

The Air Navigation Order, 1949. *Rules of the Air*. (Particularly section 5, also note Regulation 24). Price 2s.

Air Navigation (Radio) Regulations, 1949. (Particularly section 7.) Price 5d.

Civil Aviation Communications Handbook (M.C.A.P. 5). New Edition. Price 1s 6d.

The "Q" Code (as amended) (M.C.A.P. 1, 1946). Price 1s 6d.

Air Navigation Regulations (Instrument Rating: Section 13). Price 1s 8d.

M.C.A.P. 56 Instrument Rating explanatory pamphlet. Price 6d.

All the above booklets can be purchased from H.M. Stationery Office (York House, Kingsway, London, W.C.2). M.C.A.P. 56 contains a list of books recommended for study in connection with Instrument Rating ground examination.

Some useful hints on future intentions are contained in M.C.A. *Information Circular* No. 105 of 1949 (obtainable from the M.C.A. at Ariel House, Theobald's Road, London, W.C.1) in which is outlined the policy underlying the development of basic control and navigational services in the United Kingdom during the next two or three years.

It is stated that the use of the M.F. band for air-ground communications will contract rapidly, and that the provision of V.H.F. radio-telephony equipment for airfield and approach communications at M.C.A. airfields is now virtually complete.

V.H.F. D/F. will continue to be available for navigational services at many airfields, but the ability to use this facility alone will not continue to be sufficient for air-traffic control purposes for flights under I.F.R. in controlled areas and zones associated with major airports. The minimum scale of airborne equipment will be V.H.F. R/T., M.F. receiver associated with D/F. facilities and V.H.F. Fan Marker receiver. On this subject the Circular states that it is intended progressively to extend the system of positive control of air traffic throughout the country.

Regarding the use of V.H.F. R/T., the Circular says:—

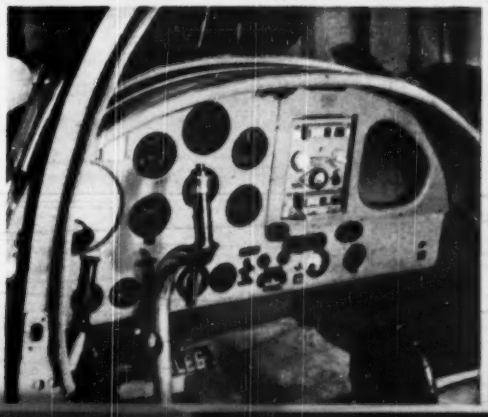
"(a) For international flying it is highly probable that full operational flexibility will be achieved only if aircraft are capable of communicating on at least 19 frequencies.

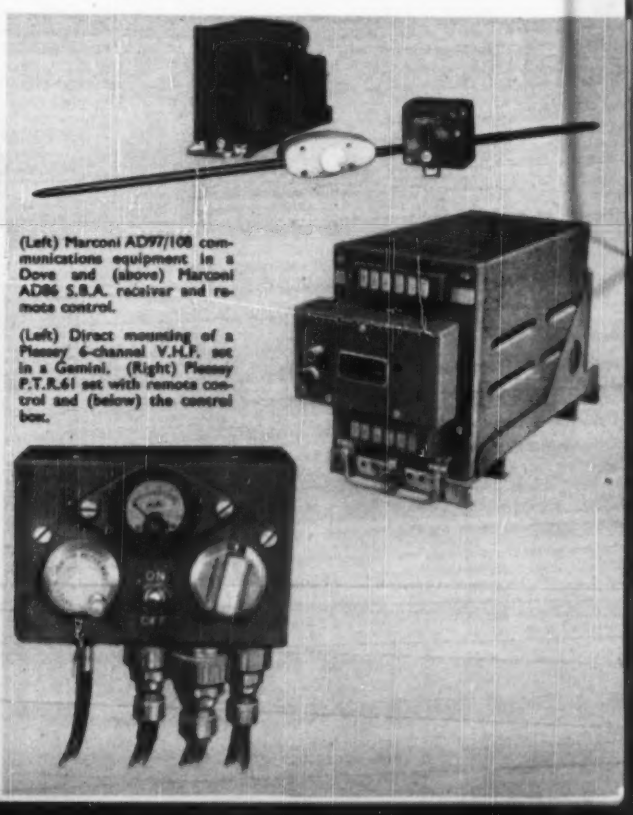
"(b) For flying within the United Kingdom it is probable that full operational use of all aerodrome, approach and *en route* facilities will be achieved only if aircraft are capable of communicating on as many as 10 frequencies.

"(c) It must be stressed that these measures are essential for the safeguarding of individual aircraft in flight as well as being in the interests of general air safety. Consequently, aircraft which have less than full facilities will find their activities restricted to those routes on which their inadequate equipment will allow communications to be maintained."

M.F. Receiver with Associated D/F.—The use of the M.F. band for navigational facilities (beacons, ranges, etc.) is increasing. More and more facilities have to be compressed into the restricted frequency band and there is no doubt that the utilization of the M.F. navigational facilities will continue for a considerable time to come.

On October 20th, 1949 a V.H.F. R/T. system on multi-carrier principle was originated as part of a plan to provide continuous two-way communication and D/F. cover for Great Britain, the Channel Islands and part of Northern Ireland. So far the area covered stretches southwards as far as Dyce (Aberdeen).





(Left) Marconi AD97/108 communications equipment in a Dove and (above) Marconi AD86 S.B.A. receiver and remote control.

(Left) Direct mounting of a Plessey 6-channel V.H.F. set in a Gemini. (Right) Plessey P.T.R.61 set with remote control and (below) the control box.

Dorothy Wilding photograph.
Honorary Air Commodore His Royal Highness the Duke of Gloucester.

The badge of No. 501 has undergone some changes. The pre-war "(B)" —for "bomber"—has been erased and the prefix "Royal" has yet to be incorporated.

Squadron Leader A. C. Henderson, D.F.C., the commanding officer.

WEST COUNTRY AUXILIARIES

No. 501 (County of Gloucester) Squadron, R.Aux.A.F.

THOSE who were fortunate enough to be present at Filton for the first flight of the Brabazon will remember the wonderful show put up by the aerobatic trio of No. 501 Squadron in their Vampires. No. 501 is also a remarkable unit in other ways. To mention but two, it was the first squadron to have a royal Honorary Air Commodore (the Duke of Gloucester) and of its Auxiliary airmen, nearly 50 per cent are drawn from the aircraft industry. Many of these men are, of course, employees of the Bristol Aeroplane Co., Ltd., but almost as many come from B.O.A.C. and a few make the journey from as far afield as Glosters, 40 miles away.

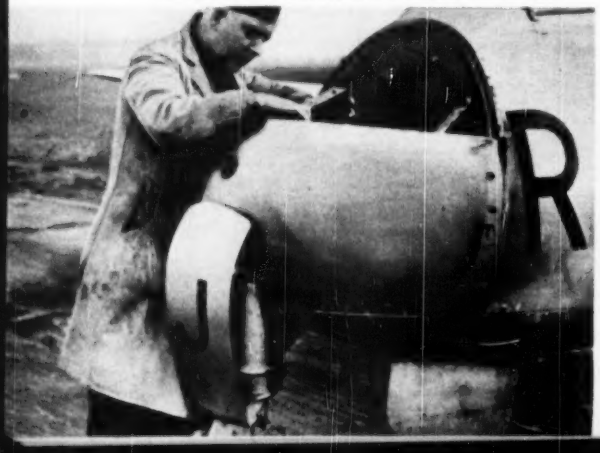
At the moment the Squadron has twelve Auxiliary pilots, seven of whom have qualified for their green instrument tickets, while a further two are expected to qualify shortly. Of these pilots, four have the D.F.C. and one the A.F.C. In common with all other Auxiliary units the Squadron is somewhat worried about replacement of these older pilots, though it hopes that younger men will be keen enough to join after finishing their period of National Service with the R.A.F.

Available for the pilots are twelve Vampire 1s, three Harvards and two Meteor 7s. It is found that six or eight Vampires, on the tarmac, ready to fly, are sufficient to meet each week-end's requirements. The two-seater Meteor 7s are, of course, used for conversion courses to jets, and for instrument instruction and pilot checks. The Meteors are comparatively new but they already bear the squadron markings sanctioned for the R.Aux.A.F. These insignia comprise the squadron badge with a small panel of interlocking, two-colour triangles on each side. When newly applied No. 501's marking looks very smart with its triangles of black and gold, but there is a very real problem in getting the paint and the badge transfers to stand up to the wear and tear of high-speed flying. The badge transfers, which cost nearly £1 each, are frequently spoiled on their first flight. Now the Squadron has moved from Reserve to Fighter Command they are looking forward to the time when the R of the identification letters on their aircraft is replaced by an F.

Handicapped, as are most units, by a lack of bodies to do all the necessary work, F/L. Cocks, the regular engineer officer of the Squadron, finds that the simple maintenance of the Vampires helps in solving this problem —not the least advantage being their lightness and modest dimensions, which enables a small ground crew to cope with the necessary handling.

As with the regular squadrons of Fighter Command, the ground crews have been issued with the new kerosene-proof overalls. These are very comfortable at this time of the year but, since they are made of rubberized fabric, and therefore without ventilation, it is doubtful whether it will be possible to wear them for work during the summer without extreme inconvenience. Some sort of protective clothing is very necessary, because of the penetrative powers of kerosene. Without such protection the men's footwear and clothing become soaked with fuel oil and this results in their living quarters reeking of kerosene. In the case of the Auxiliaries it presumably spreads to their hearths and homes.

Fitting a 16 mm. camera gun into the nose of a Vampire.



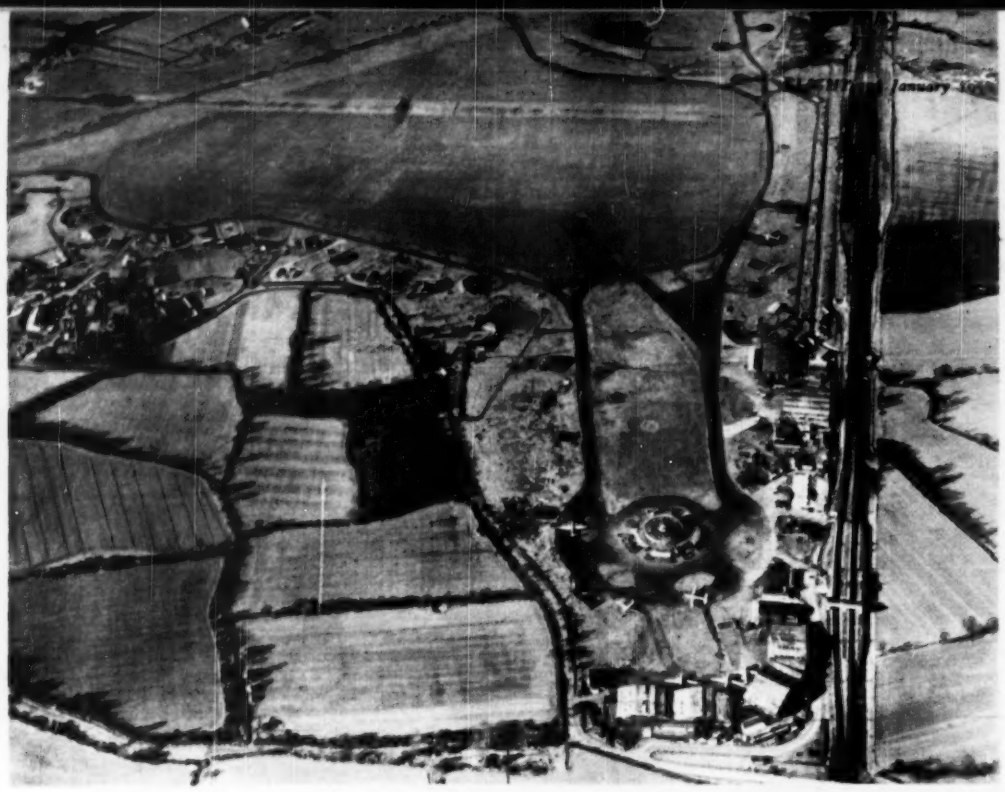
F/L. Cocks supervises the offering-up of a long-range fuel tank.

Putting finishing touches to the squadron insignia on a Meteor 7. The badge is in colour and the triangles in black and gold.

Illustrated by "Flight" Photographs.

Airmen in the new anti-kerosene suits at work on a Goblin jet unit of a Vampire I.

Some officers and airmen of No. 501 Squadron. The officers, left to right, are :—F/O. M. C. Collings, F/O. E. B. Smith, F/O. G. A. Kidd, D.F.C., F/O. E. F. Skuse, F/L. R. E. H. Fender, A.F.C. (Aux. Equip. Off.), F/L. J. C. Steele (Adjutant), S/L. A. C. Henderson, D.F.C. (C.O.), F/O. W. J. Gillespie, F/O. S. C. Stephens, F/L. P. R. McGregor (Flt. Cdr.), F/L. A. J. Cocks (Eng. Off.). Also in evidence is Dog Turbo.



Looking northward over Gatwick Airport. In the foreground are the circular terminal building, the hangars and the railway station.

GATWICK

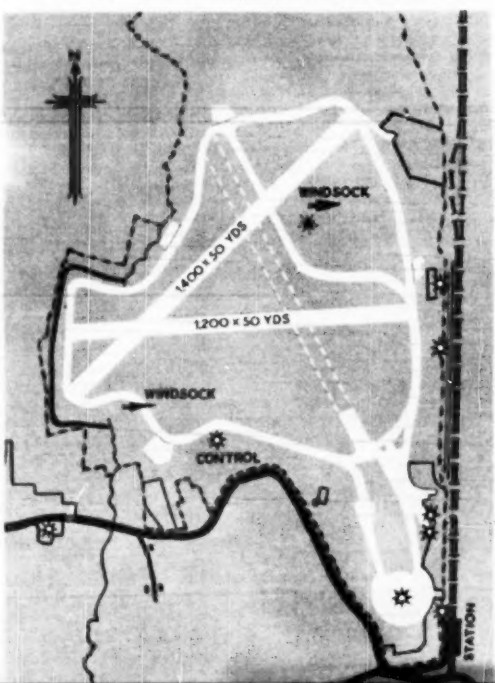
A Possible Diversionary Airfield for London

THE prospects of Gatwick as the major southern diversionary airfield for traffic to London Airport are at present the subject of some speculation. Although the facilities now offered are sufficient for the seven charter companies whose operations comprise most of the flying there, an extensive development plan would no doubt be necessary in order to equip the airfield for the reception of numerous scheduled air services in adverse weather. Use of the airfield, which is closed at dusk, is at present restricted to aircraft not exceeding 10,500 lb a.u.w.

Owned by Airports, Ltd., and controlled by the Ministry of Civil Aviation, Gatwick airport is situated fourteen miles south of Croydon. It has been found that, when conditions in the London Control Zone have deteriorated below the permissible limits for instrument approaches, Gatwick is usually still open. Three runways are provided, two being covered with steel mesh; the other is a grass strip. The dimensions are 1,400yd in the S.W.-N.E. direction and 1,200yd in the E.W. and S.E.-N.W. directions.

A concrete perimeter track with hard-standings surrounds the whole airfield and taxiways lead to the terminal building and hangars. Safety height within 25 nautical miles is 2,500ft, and the only major obstruction is the small range of hills approximately 500ft high, 3½ miles to the south. The airport has Customs and meteorological facilities, together with a modern terminal building which provides restaurant and refreshment amenities. A most important feature is its excellent railway communication with London, provided by an electrified line running through a station connected by subway to the airport terminal building. All these facilities, of course, are a legacy of Gatwick's busier pre-war days.

Plan of Gatwick Airport, showing configuration of runways and perimeter track. Obstruction lighting is denoted by stars.



PROGRESS

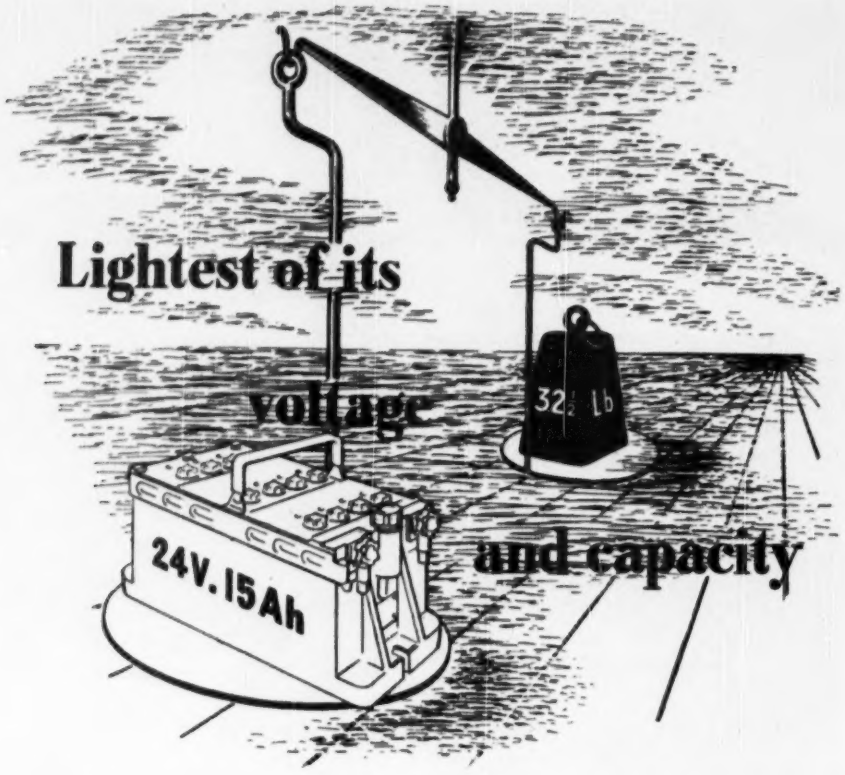
The Vickers "Viscount"

the first prop-jet airliner
in the world to fly

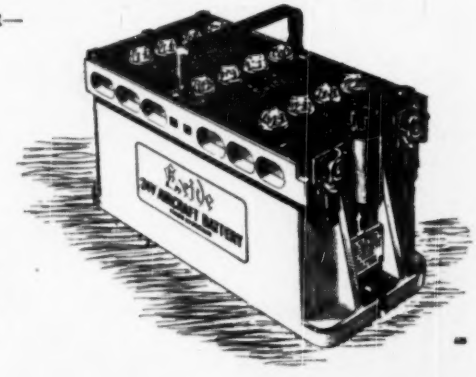
powered by

ROLLS-ROYCE
Aero
ENGINES

ROLLS-ROYCE LIMITED · DERBY



The Exide 24V. battery is the lightest British civil aircraft battery of its voltage and capacity. That one fact gives it a very sound claim for consideration when batteries are being chosen for aircraft. What else has this Exide battery to offer? Exceptional electrical performance, long-life plates and high current outputs for engine starting. Very advanced design in every detail—but *sound* design, bred from over 50 years' experience of battery manufacture. Not only best because lightest—but lightest *and* best.



Exide

AIRCRAFT BATTERY

24 V. 15 Ah. 32½ lb. — 24 V. 25 Ah. 43½ lb.

A PRODUCT OF CHLORIDE BATTERIES LIMITED · EXIDE WORKS · CLIFTON JUNCTION · NEAR MANCHESTER

AIRFIELDS IN A WAR OF MOVEMENT

Past Lessons and Present Problems : A.V-M. T. G. Pike's Lecture to the R.U.S.I.

AT the outset of his lecture before the Royal United Service Institution on January 18th, the title of which heads this page, A.V-M. T. G. Pike, C.B., C.B.E., D.F.C.,* traced the growth of airfields during twenty-five years. "Have we now," he asked, "reached the upper limit, or will airfields continue to grow?" He confessed that he could not supply the answer.

In a war of movement, time and transportation were very precious. Speed of construction depended upon the length and width of the runway to be provided, plus dispersal arrangements, the strength of surface necessary, and the durability required, having regard to the amount of traffic and weather conditions. The lecturer recalled that in the Middle East campaign there was virtually no rain and plenty of smooth, hard sand or gravel. Apart from the dust problem, the construction of airfields for all types of aircraft was comparatively easy and quick. In Sicily much the same applied, and it was possible to scrape out flat areas in vineyards and olive orchards. These served well, and their time of construction was seldom more than two days.

Later, in Italy, the position changed when the winter rain set in. At first wire netting and other temporary expedients were used, e.g., bricks from captured brickworks, but they were never very satisfactory. It was then that pierced steel plate came to the rescue and solved the problem. "P.S.P.," the lecturer recalled, is clipped together in 10-ft lengths and is both sturdy and heavy. For a normal runway the weight is approximately one ton per yard of runway; thus, for a runway of 2,000 yd, together with a modest taxi track and dispersal, some three thousand tons of P.S.P. are required. In addition to this, if the runway was to be used for any length of time it was generally necessary to put down a gravel surface underneath it and this might require anything up to 10,000 tons of gravel. These, said the Air Vice-Marshal, were very big figures, and the Army (who were always struggling to bring supplies from the ports) disliked intensely adding many thousands of tons of steel plate to their tasks. In the Italian campaign Bari was literally choked with P.S.P. and no other stores could come through. P.S.P. was readily damaged by bombing.

Tarred Canvas

Many other materials had been tried. Perhaps the most important was what engineers called prefabricated bituminized surfacing; in other words, tarred canvas. This was extensively used in Normandy. It was comparatively light, weighing some 800 tons for typical airfields, compared with 3,000 tons of P.S.P., but was easily damaged. If the ground were kept at its best moisture-content, then little else was needed. The surfacing material was laid down by a special machine—the "stamp-licker"—just as one put roofing felt over a house. This material served pretty well, but once it was damaged by enemy action or a crashed aircraft, the rain would get in, and, once the water had soaked through the material, it was virtually impossible to dry out the ground.

The tarred canvas could usually be laid down within a week, whilst a P.S.P. airfield might take up to two weeks to complete. This, compared with the two days required in the desert or Burma, was a long time, but was the best—in fact, the only—satisfactory alternative that we knew of to-day. When compared with the building of a concrete runway, which required 15,000 tons of cement and 75,000 tons of local gravel and at least six months to construct, however, the figures for P.S.P. looked very good.

Unfortunately the airfield problem seemed to get worse and not better. About once every ten years the Air Staff decided that airfields were so large that the time had come to tell aircraft designers they must keep within existing limits. So far this noble thought had had little or no result, because there had been a serious conflict between aircraft performance and the need to restrict the size of airfields. The problem was, roughly, that the Air Staff naturally required the best possible performance. For this very reason large wheels and low landing speeds were not acceptable. Moreover, in modern aircraft the tendency was to make the wings thinner and thinner, which meant that there was less and less room to stow the undercarriage.

There were several possible solutions—for example, the multiple wheels and unorthodox arrangement of the undercarriage in the Boeing B-47 and Martin B-51. This spreading of the load on to four large wheels was naturally a big help. There were, of course, certain disadvantages—for example, the difficulty in obtaining a large angle of incidence at the point of take-off and the problem of braking after landing, when all the weight must be thrown on the front wheels. The lecturer had no doubt that these difficulties had been overcome.

The Navy's Way

Another possible solution was the naval type of arrester hook and wires. This shortened the landing run tremendously, and if combined with some form of catapult or rocket assistance for take-off, would greatly lessen runway requirements. The disadvantages were added complication, susceptibility to damage, and all the other operational inconveniences which must be surmounted in the field.

A third solution was to use water, but the lecturer declined to enter into the flying boat *versus* landplane controversy. Nevertheless, the problem was urgent and important and some solution had to be found to curb the ever-increasing airfield requirements for the air forces operating in a war of movement. It must be remembered that although the primary air forces in mobile warfare were composed of comparatively light tactical aircraft, there was nevertheless a tendency always to move the heavy bombers up behind the Army, closer to their targets. A good example of this was the move of the strategic bombers to Foggia in Italy. Here the problem was overcome, albeit with great difficulty, by the airfield engineers. But the size and weight of bombers had grown tremendously since the war. The Air Vice-Marshal had no doubt, however, that the problem would be solved and that the answer would probably be some form of compromise between the airfield engineer and the aircraft designer.

Prior to the war, dust had not been a great problem. We had operated aircraft in India and the Middle East without very great difficulty, but the first signs of trouble started in the Western Desert in 1936 at the time of the Abyssinian campaign. At this time units of the R.A.F. were sent to the Western Desert and here for the first time serious trouble was encountered, because the dust was abrasive. Immediately trouble was experienced with severe piston wear. After some delay air filters were fitted and the trouble overcome. We learnt our lesson and all aircraft subsequently operated by the Desert Air Force had filters. Thus, the Western Desert campaign was conducted without any further serious trouble.

However, trouble did arise once more in Normandy. The Spitfires were all right—all had air filters—but the Typhoons were not. Within a week of the landing the Typhoon, with its sleeve-valve engine, gave trouble, and at one time it seemed as though all the Typhoon Wings would be grounded. Drastic emergency measures were taken to fit temporary filters and the trouble was overcome, but only just in time.

This was an important lesson to remember. What effect abrasive dust might have on jet units the lecturer did not know. Perhaps they were not affected, but if they were, there was indeed a formidable problem to filter the huge amount of air passing through.

---

* *Among the posts held by A.-V.M. Pike has been that of Director of Operational Requirements, Air Ministry, a post demanding practical experience of many aspects of air warfare, including that which formed the subject of his lecture. He is now A.O.C. 11 Group.*

BRABAZON PROGRESS

Successful Results of Initial Testing: A Rumour Denied: Reserve Crew Now Under Training

IN contrast to the wide publicity aroused by the first flight of the Bristol Brabazon I on September 4th last year, its subsequent embarkation on an involved and lengthy programme of flight-testing has been kept out of the limelight. Any anxiety which may have been evoked by the comparative shortage of information will at once be allayed, however, by a new report from the Bristol Aeroplane Company on the huge airliner's satisfactory progress to date.

In the course of 13 flights, it is stated, the Brabazon has logged 29 hours' flying, during which tests have mainly been concerned with oil- and engine-cooling, airscrew strain-gauging, and checking stability and control. Much additional test equipment, necessary for successive stages of the programme, has been installed and further equipment will be installed as necessary.

Cooling, of both engines and oil, has proved completely satisfactory; in fact, it is considered that the Brabazon's engine installation, with the power units completely encased in the wings, gives better cooling than that experienced on any other type of layout. The aircraft's performance promises that estimates of cruising and maximum speeds—250 m.p.h. and 300 m.p.h. respectively—will prove accurate. A period of flying with one of the four pairs of twin Centaurus power units switched off had, it is stated, virtually no effect on flying and handling characteristics.

Weight, speed and operational altitudes are to be progressively increased. The Brabazon has flown at altitudes up to and including 10,000ft, and at a maximum weight of 98 tons, compared with 94 tons for the maiden flight. Weight will now be increased to 110 tons and will be gradually stepped up until the prescribed 130-tons maximum is attained. The normal flight-test crew numbers ten, although the aircraft has flown on occasion with a total of 20 crew aboard, the additional personnel comprising technicians brought in to handle simultaneous series of tests.

Flying has been confined to the south-west of England, principally because it has provided weather suitable for the particular tests being undertaken. Later on, as the weather may be expected to improve, flights will be extended, and it is then hoped that it may be possible to advise provincial newspapers that the aircraft will be flying in their locality to enable members of the public to be on the look-out for the machine. (Readers may remember that a suggestion on these lines was made in *Flight* of December 22nd.)

Some sections of the National Press have recently reported that the Brabazon may shortly undertake a transatlantic flight. The Bristol Co. describes these rumours as "purely conjectural," and emphasizes that a test of this kind plays no part in the immediate development programme. The official statement stresses that, while such a flight may ultimately take place, it can only be approached after further extensive testing.

A complete reserve crew for the "Brab" is now being trained. Co-pilot W. Gibb, after making a series of take-offs and landings under the supervision of Bristol's chief test pilot, A. J. Pegg, flew as captain on the latest flight, with E. H. Statham, a third Bristol pilot, as "second dicky." To ensure continuity of testing, the remaining members of the reserve crew will be trained as soon as possible.

ACCURATE WING-SURFACES

Advantages of a Structural Method Evolved by Westland Aircraft

THE construction of wings and other surfaces sufficiently smooth and free from waviness to meet laminar-flow requirements is a problem that inevitably accompanies the achievement of very high performance. In *Flight* for December 1st and 8th, pages 701 and 749, details were given of a system of construction used by the Fairey Aviation Co., Ltd., and consisting briefly of building "from the outside in." It is based on a method of holding the external surfaces accurately to contour while the internal structure is being assembled.

A variation of this routine, and one typical of the present-day trend, was that used in the Armstrong Whitworth tailless research aircraft, the A.W.52*. A more recent example is a system developed by Westland Aircraft, Ltd., and adopted on the Wyvern. Here the laminar-flow surface is confined to approximately the forward 40 per cent of the chord and terminates at the spar. Forward of this station, the skin is continuous except for a butt-joint on the extreme leading edge.

Rib-booms, formed from angle-section, are riveted or spot-welded to the skins before assembly, and these skins are then held accurately to profile in suitable fixtures while the rib-webs are assembled to the booms. By virtue of the arrangement shown diagrammatically in the accompanying sketch, the angles form, when assembled, very rigid triangular tubes. By drilling and riveting the webs to the booms with the skins held accurately to contour, errors which would normally arise in assembling the complete ribs first are entirely avoided. Access for riveting is gained from the rear.

It is claimed for this system that it is possible to produce surfaces that conform to a tolerance band of 0.005in or, in other words, that do not vary from the mean by more than 0.0025in. above or below. These figures are measured between gauge-points three inches apart. Another advantage of the system is the stability of the structure; an integral leading-edge tank, for example, has been tested to 8 lb/sq in. and this accuracy is still maintained.

* *A detailed description of the system used for the A.W.52 wing was published in the March, 1947, issue of our associated journal "Aircraft Production."*

FOLLAND APPRENTICES' SUCCESSES

HOW a lad was taken away from the company's apprenticeship scheme after World War I because his parents said he would receive 2s a week more on the dole was recalled by Mr. H. P. Folland, M.B.E., F.R.Ae.S., M.I.Ae.E., F.R.S.A., F.I.Ae.S., managing director of Folland Aircraft, Ltd., Hamble, on the occasion of the apprentices' annual prize-day. Today, said Mr. Folland, parents took a more commonsense view.

In a review of the year's progress the education officer, Mr. J. Dynan, spoke of the outstanding successes in the Ordinary and Higher National Certificates. Distinctions included the award, for the second consecutive year, of two entrances to the College of Aeronautics. Mr. Dynan paid tribute to the co-operation of both the Southampton Technical School and Southampton University College.

Speaking on behalf of the apprentices, Mr. K. J. Scott said they thought the scheme a grand one. If it was not the best in the country, it was certainly one of the best.

UNDERCOVER

SUCH B.B.C. plain-language code messages as "Six friends arrive to-night" brought hope to many allied resistance groups during the war, for it meant that help was on the way to them by air. Sometimes it consisted of parachute containers of arms or food, sometimes of a team of Allied soldiers belonging to the Special Air Service.

Lt. Kirschen has, therefore, chosen the title of his book* wisely. As a Belgian member of the S.A.S., he was often one of "six friends" parachuted into Europe to work with "the Underground" on intelligence missions.

The way in which Kirschen and his colleagues were able to radio back to London information on German troop movements and suggested targets for R.A.F. bombers, right under the noses of the enemy, makes an exciting, almost unbelievable story. It has already run to eleven editions on the Continent, and gained for its author the "Grand Prix Bibliotheque."

* *"Six Friends Arrive To-night," by Gilbert Sadi Kirschen. Nicholson and Watson. Price 8s 6d.*

Tasman chose Solents!

Tasman know . . .

(TASMAN EMPIRE AIRWAYS LTD.)
NEW ZEALAND

- Solents are the first British civil aircraft in actual service which meet the standards laid down by I.C.A.O.
- The Solent will carry 44 passengers in safety and comfort 1,350 miles over the Tasman Sea.
- Tasman fares are among the lowest in the world, yet they have operated profitably since 1940 using Short flying boats.

The first manufacturers of aircraft in the world

Shorts

SHORT BROTHERS & HARLAND, LIMITED, QUEEN'S ISLAND, BELFAST
LONDON OFFICE: 17 GROSVENOR STREET, W.1.

The first and only

ELECTRICAL TURN AND SLIP INDICATOR

approved for service with the Royal Air Force.

PULLIN

1000 HOURS NORMAL PERIOD BETWEEN INSPECTIONS

Write direct for fully illustrated leaflet to the sole manufacturers

P. B. PULLIN & CO. LTD · PHOENIX WORKS · GREAT WEST ROAD · BRENTFORD · MIDDLESEX

Telephone EALing 0011 (3 and 3661 (3 Telegrams Pullinco, Westphone, London

Fly to a Commission

. . . in the R.A.F.

When you qualify for your wings it shows that the Royal Air Force has a high opinion of your mental and physical qualities. It is from among young men like you that the R.A.F. will choose its future leaders. That is why all Pilots and Navigators considered suitable are guaranteed commissions before starting their flying and officer training—subject to satisfactory completion of the course. This leads to promotion—high promotion if you are worthy. Age limits 17½—24 (exceptionally 25).

There are also special opportunities for certain qualified Pilots, Navigators and Signallers above the age limits for direct entry.

To: Air Ministry, Dept. F.R.I. Victory House, Kingsway, London, W.C.2

* Send details of (1) direct entry to Flying Branch (2) special schemes for ex-pilots and navigators (give previous rank) (3) special schemes for ex-signallers.

NAME .....

ADDRESS .....

* delete two of these

Learn to fly in the

ROYAL AIR FORCE

and be trained to lead!

LONDON AIRPORT GROUND TRAFFIC

Final Sections of the M.C.A.'s Study and Report

IN last week's issue of *Flight* (pages 40-44) we summarized the major part of an illuminating study* of the ground-traffic potentialities of London Airport, made by the Ministry of Civil Aviation with a view to eventual organization of the various services for maximum efficiency. Dealt with in this first section were routing of arriving and departing aircraft in relation to disembarkation, loading and maintenance points; parking-stand requirements; and manœuvring of aircraft by tractors or other methods (in view of the objection to taxying jet and turboprop types in the vicinity of passenger buildings and other aircraft). Our summary of the report continues here with a consideration of vehicle-handling methods and with notes on the handling of passengers on arrival and departure.

Vehicle Movements.—Present operations on the apron at London Airport present a picture of what might be termed "a confusion of vehicles" operating to and from aircraft. Many airlines operate their own vehicles used for aircraft handling and, although it presents no great problems at the moment, the application of this system to a higher movement-rate of aircraft will necessitate rationalization of all vehicle movements. An extensive study of vehicle movements was therefore carried out on the scale model of the Central Area. For the aircraft movements to and from the S.E. face the necessary vehicle movements were worked out and incorporated in the assessment. On this face, with its 150ft stands, short-haul European traffic will be handled. Among other assumed factors it was also considered that scheme (d) of the tractor-movement study was in operation. Twelve types of vehicle (indicated in the key to the drawing below) were assumed to be required.

It was found that a total of 97 vehicles was necessary to attend the 27 aircraft using the 16 stands on the S.E. face. On this basis, total requirements for the whole area would be 388 vehicles. Vehicle-movement rates on the roads were 250 per hour between the inner bays and the building face and 100 per hour to and from the outer stands. The conclusion of this investigation was that the road system in use had the disadvantage of throwing a large volume of traffic on to the road passing in front of the buildings; further study was therefore made of both alternative-road systems and of the possible provision of conveyors or gangways to carry passengers' baggage, mail and freight between aircraft and individual stands and the buildings.

It was also decided that operation in the Central Area of individual fleets of vehicles would be quite impossible. A central pool of vehicles with their use co-ordinated so that the minimum traffic is imposed on the apron and the roads leading to it, is considered essential. Further investigation of the conveyor suggestion showed that it was possible to reduce the number of types of vehicles required to four, i.e., servicing car, oil tanker, sanitary wagon and fire tender. Furthermore, the road between the inner stands and the building face could be eliminated, such vehicles as are required on the inner stands being routed between the stands and the inner taxiway. Vehicles from the outer stands were routed to the ends of or underneath the buildings, and in this way the passengers from the outer stands could be fed into the handling units to join the same channels as the passengers entering the face of the building from the inner stands. With this method the number of vehicles required was found to total 72 and, for the whole Central Area, approximately 288. The second scheme seemed to be more practical, and development of and experimentation with conveyor equipment is already in hand. The general problem of vehicular traffic in

* "*London Airport Ground Traffic Movement.*" (*M.C.A.P.* 68.) *Price* 1s 6d. *H.M. Stationery Office.*

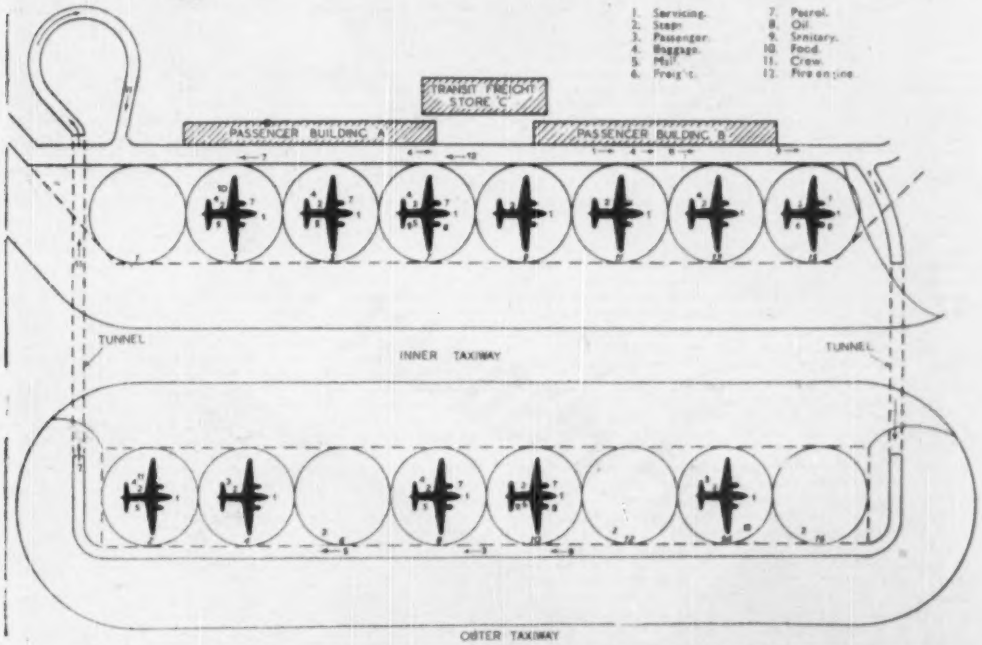


Fig. 7. Planning vehicular traffic in accordance with the expected high rate of aircraft movement necessitated extensive studies on the scale model. This diagram shows the position of all vehicles essential for the turn-round of an aircraft at the sixteenth minute of study. The vehicles are identified by numbers, a key to which is given above the drawing.

LONDON AIRPORT GROUND TRAFFIC . . .

the Central Area involved a study of road systems and car parks.

The following are the main requirements which must be met in any road system in the Central Area:—

(a) The apron traffic and that on the public road system behind the buildings must be completely separated.

(b) The apron vehicles concerned with passenger handling, i.e., baggage trucks and passenger buses should always feed into the buildings on the apron side in order that passengers and baggage may be "processed" in the correct sequence.

The conveyor system is recommended, combined with a road from the outer stands either to the ends or underneath the buildings, so that apron traffic can be kept separate from the public road traffic in the Central Area, the latter traffic being outside Customs control. The building must then be designed to accept arriving loads through side-entrances which lead the passengers and baggage into the correct direction of flow through the handling buildings, that is, front to rear.

It is estimated that with the possible passenger movement rate of up to 3,000 per hour, some 60 buses (carrying 30 passengers each) and 600 private cars (carrying two passengers each) will make a total of nearly 700 vehicle-movements on the public road system in the inner area. Investigation at London Airport has shown that passenger traffic represents only a small percentage of the total; assuming the percentage of passenger vehicles to be as high as 30, the main-road system may be called upon to handle up to 2,300 vehicles per hour. This figure, however, could be considerably reduced by replacing private car traffic by bus services.

A further study was also carried out to assess the number of vehicles required in the interim terminal scheme, the results of which were that a total of 85 vehicles would be required to attend the 30 aircraft using the 15 stands which the scheme provided. The figure of 85 vehicles would be achieved only by carrying out all apron services by means of a central pool of vehicles. It is recommended that the final building design for the interim scheme be such as to provide adequate space for such parking as is necessary with the use of a central-pool system.

Passenger Handling

A further aspect of ground-traffic organization, at a large airport, that of passenger handling, was also investigated to determine the scale upon which handling-buildings would have to be provided in order to accommodate peak movement-rates of aircraft. The general conception of handling-buildings in the past has been the provision of the necessary controls in one large building, the size of which was adjusted in accordance with the number of passengers likely to use it. In recent years, however, a move has been made towards tackling the problem from the point of view of the number of individual loads to be handled, and, therefore, the establishment of small sub-sections or channels, each channel being completely equipped and staffed with all the necessary controls. Thus the size of the building depends upon the number of channels necessary to handle a specific movement rate and the size of each channel can be assessed on the basis of the number of passengers per aircraft. The purpose of the study was to assess the number of channels required and three ways of using them were investigated:—

(i) It was assumed that a road system existed along the front of the buildings, so that any aircraft load could be taken to any channel in either of the two handling-buildings provided on each face.

(ii) Each inner stand was assumed to be served by a channel opening directly from it and loads from or to the outer stands were brought to any available channel in either building.

(iii) In addition to the inner stand being served by a channel opening directly from it, a separate set of channels was provided to handle outer-bay traffic, these were placed in that part of the buildings nearest the exits from the vehicle tunnels leading from the outer bays.

Two methods of sub-dividing the channels were considered. In the first, the controls were assumed to be divided into three equal parts containing the three controls required, Health, Immigration and Customs. It was then assumed that a second load could not be fed into a channel until the previous load had cleared the Health control (in the case of arriving loads) and Customs control (departing). Observations have shown, however, that the Health control is passed more quickly than Immigration. Thus, to avoid congestion and to match the handling times required by all three sections, a considerable increase in staff and space would be required in both Immigration and Customs. The method was therefore abandoned.

In the second case, Health and Immigration controls were considered as a unit from the point of view of time, and the period in which a load was occupied with these two controls was assumed to be matched with the times spent in Customs; thus a second load was not fed into the channel until the previous load was (a) cleared by Health and Immigration or (b) clear of Customs, in the case of arrivals and departures respectively. Four channels were assumed to be provided initially in each building—in other words, eight channels per face or one per inner stand. (The number was increased when it became apparent that it was not adequate.) The "land-side" waiting room was assumed to be common to all channels, but "apron-side" waiting rooms were assumed to be individual to each channel. The following assumptions were also made in respect of times spent in the various controls:—

Departure Loads

	min
From "coach arrival" to "clear of Customs"	10
From Immigration to "complete load in apron-side waiting room"	10

(Present practice is for coaches to arrive at the building 30 min before the aircraft is due to leave.)

Arrival Loads

From "apron-side waiting room" to "Health and Immigration completed"	15
Customs to "complete load in land-side waiting room"	15

The study was carried out on the same basis as the vehicle-movement studies, i.e., on the assumption that 27 aircraft used the 16 bays on this face in the peak hour under consideration. Average number of passengers per load was assumed to be 30.

The results of the study were found to be that the 27 aircraft using the stands in the hour constituted 31 potential movements of passenger loads, four aircraft being turned round within the hour. The maximum number of loads handled simultaneously was 16 (equivalent to 480 passengers). It was found that seven channels per building, or 14 per face, were necessary under each of the three previously mentioned methods of directing the loads to the buildings. The average utilization per channel was 46 min. Even at the peak moment in the hour (when 16 loads were being handled) only three channels were fully engaged.

It was concluded that this fact demonstrated that, with mobility of staff in the buildings, full staffing would not be required for all channels simultaneously. The figure of four channels per building used initially in the study was considered inadequate, because allowance must be made for the reverse use of some channels during the hour; aircraft turning round within the hour also increased the number of channels required as the incoming and outgoing loads must be going through the handling-buildings simultaneously.

A comparison of the three means of using the channels showed that, by method (ii), inner-stand traffic could be handled very satisfactorily; for "turn-round" aircraft the channel adjacent to that opposite the aircraft was used for the second load. The selection of channels for outer-stand traffic was found to be quite flexible.

A similar study was also carried out on the N.W. (long-haul) face where 22 aircraft loads were handled in the hour. In this case the times for both departing and arriving loads were assumed to be Customs, 15 minutes; Health and Immigration, 15 minutes. It was found that method (i) required seven channels in all, with an average utilization per channel of 58 minutes. Method (ii) required eight channels—four in each building or one for each inner stand. All loads from the outer stand could be accommodated in these channels, and the average utilization per channel was 51 min.

In this study it was concluded that the high utilization factor of 58 min with method (i) was unobtainable normally, because congestion would frequently occur. It was therefore estimated that eight channels per face is a fairer estimate of the requirements. As on the short-haul face, however, it was proved that method (ii) was the more attractive. On the long-haul face, also, the outer stands were less used, and decrease in the stand occupancy time on this face could make the loading and unloading, from aircraft not requiring 300ft stands, possible in the inner stands—with the outer ones available for parking aircraft.

Mathematical Treatment.—Extensive time-and-motion studies are now being carried out both at London and Northolt airports to determine whether handling times are approximate to those assumed in the study, to provide a basis for working out a mathematical theory on congestion in the present buildings, and to provide data for detailed design of future handling-

WESTERN AVENUE. PARK ROYAL. LONDON. W.3

Eight hours by hand...

or 48 minutes with a Van Dorn Sander!

Think of it in terms of *time*, of *money*... of the size of job you can tackle... Whichever way you look at it a Van Dorn Sander is a business builder and a money saver! Sands wood and metal, shapes timbers, rubs down paintwork, surfaces concrete and does light grinding - 10 times faster than hand methods. Ask your nearest Distributor for details.

"Van Dorn"

DRILLS · SCREWDRIVERS · VALVE REFACERS AND RESEATING EQUIPMENT · SHEARS · SANDERS BENCH & PORTABLE GRINDERS, ETC.

PORTABLE ELECTRIC TOOLS

Sold by leading Distributors everywhere

VAN DORN ELECTRIC TOOLS DEPT. L.I. HARMONDSWORTH, MIDDX. PHONE: WEST DRAYTON 2681/7

LONDON · BIRMINGHAM · BRISTOL · GLASGOW · LEEDS · MANCHESTER · NEWCASTLE · NOTTINGHAM

Smee's

LONDON AIRPORT GROUND TRAFFIC . . .

buildings at London Airport. A full mathematical treatment of the passenger-handling problem is being evolved, but the following method gave a rough check on the number of channels required:—

It was assumed that it requires on the average 15 min to clear a departing load of 30 passengers sufficiently to allow a channel to have another load fed into it, and 22 min to clear a similar arriving load to the same extent; these figures were extracted by interpolating data acquired in the time-and-motion studies to date. If loads were fed in for any length of time at these intervals, as they were average intervals, congestion would undoubtedly have arisen: it is estimated from considerable research work on congestion that utilization factors of 0.8 and 0.7, if applied to departures and arrivals respectively, reduce congestion to a satisfactory minimum. This means that $15/0.8 = 18.75$ min are required for departing loads, and $22/0.7 = 31.43$ min are required for arriving loads before further loads are fed into the same channel.

The number of channels required for 31 aircraft movements, consisting of 12 departures and 19 arrivals in the hour in the first study, is therefore

$$12 \times 18.75/60 + 19 \times 31.43/60 = 13.7 = 14 \text{ (approx.)}$$

and for the long-haul face the same calculation for 22 aircraft movements consisting of 9 departures and 13 arrivals in the hour gives the number of channels necessary as

$$9 \times 18.75/60 + 13 \times 31.43/60 = 9.6 = 10 \text{ (approx.)}.$$

The first figure (14) is in agreement with the result obtained above, i.e., 7 channels per building; the second figure (10) is higher than that obtained previously for the long-haul face. This suggests, says the report, that the ratio of aircraft loads handled through each channel per hour of 2.21 for the first study is nearer that realizable than the 2.75 for the second study. Much further work has still to be done in this field, but these calculations at least check that the results obtained by the methods employed in these passenger-handling studies are reasonable.

ATTACKER PERFORMANCE

QUANTITY production, for Naval Aviation, of the Vickers-Supermarine Attacker has been in progress for a comparatively short time. The aircraft was built to the wartime Air Ministry specification E.10/44, first flew in 1946 and on May 15th, 1947, formed the subject of an extensively illustrated *Flight* technical description.

It can by no means be classed, therefore, as a new fighter; nevertheless, its performance bears favourable comparison with that of most current Service types, as the latest figures indicate. The production version of the Attacker differs mainly from the prototype in meeting Naval requirements, and the basic design remains unaltered.

The manufacturers have announced, however, that the fuselage is capable of fully utilizing "future developments in engines and reheat." Another aspect of development has already been illustrated by the successful Supermarine 510, a swept-wing research type evolved from the Attacker, which has achieved Mach numbers considerably in excess of 0.825. The latter limit has been attained by the Attacker itself on several occasions, the only result being a gradual change in longitudinal trim.

Without its 250-gallon drop-tank, the Attacker has a maximum speed at sea level of 586 m.p.h., and, at 30,000ft, of 535 m.p.h. Its initial rate of climb is 6,250 ft/min, and the ascent to 30,000ft takes 7.1 min; at this height the range and endurance, with drop-tank, are 1,189 miles and 3.65 hr. Corresponding figures with internal tankage only (capacity, 293 gal) are 589 miles and 1.86 hr. The Attacker's power unit is a Rolls-Royce Nene 3 of 5,000 lb static thrust.

In service trim, without the overload tank, the all-up weight of the Attacker is 11,750 lb, of which fuel accounts for 2,373 lb. The accompanying break-down of the fixed and removable loads carried by the Attacker is of especial interest, in that it depicts typical requirements of the modern fighter:—

	Fixed (lb)	Removable (lb)
Windscreen de-icing and de-misting	10	4
Armour protection	380	—
Engine-bay fire extinguisher	20	—
4 Hispano 20 mm guns and 424 rounds	90	836
Seat and instrument boards	50	—
Gun heating system	18	—
Cabin pressurizing	33	—
Oxygen (two 750-litre bottles)	19	35
Provision for bombs and R.P.s	16	—
Gun-sight	3	3
Instruments	83	—
Radio	45	58
Cine camera	5	8
Electrical equipment	144	—
Miscellaneous equipment	8	1
Ballast	—	400
Pilot and personal equipment	—	235
Total load (lb)	940	1,579

DEATH OF GENERAL ARNOLD

IT is with deep regret that *Flight* has to record the death of General Henry H. Arnold, wartime commander of—as it then was—the United States Army Air Force. General Arnold, who was 64 years of age, died at his California home, where he was living in retirement.

At the outbreak of war the General was already in command of the Force, and had to undertake the task of bringing it up to strength in men and materials. In 1940 he was Acting Deputy Chief of Staff, and in March, 1942, was appointed Commanding General. His responsibilities included those of co-ordinating the combined bomber offensive against Germany and also the direction of U.S. air power in the Far East. In 1944 he was appointed to the rank of General of the Army.

General Arnold.

From the inception of Lease-Lend his duties brought him frequently to this country, and he was quick to assess the value of the jet-propulsion experiments then being made by Whittle and his team. As early as 1941 he was instrumental in getting approval for two firms—Bell Aircraft and G.E.C.—to embark on a turbine development programme based on information obtained from England. It speedily bore fruit in the production of the Bell XP-59, which flew on October 1st, 1942, only a year after the British data had been obtained. Thereafter, American jet development received the steady encouragement and assistance of the far-sighted commander.

General Arnold had learned to fly as far back as 1912, under the tuition of the Wright Brothers, and in that year he won the Clarence A. Mackay trophy by making a 30-mile circuit of Washington. Twenty-three years later, in 1935, as commander of a formation of bombers, he won the same prize for a flight to Alaska. In these inter-war years he commanded a number of U.S. air stations, and in 1936 was given a Washington appointment as Assistant Chief of Staff, U.S.A.A.C.

FOKKER DESIGNER RESIGNS

CO-INCIDENTALLY with the recent re-organization of the Fokker business at the behest of the Dutch Government, Mr. M. Beeling, director and chief designer, has resigned his post. Since he joined the firm in 1923 he has been progressively more closely associated with the design of the firm's products, and in recent years has been solely responsible for a number of outstanding types. Starting as a technician in the research department, he became head of the section in 1927, and in 1938 was appointed chief designer, his appointment to the board following soon after the war. During the period of the German occupation he was successful in hoodwinking the enemy and keeping the firm's technical staff together in spite of their efforts to break it up. Fokker types for which he has been responsible include the famous F.7 series of airliners and the G.1 twin-boom fighter, while since the war his designs have included the F.25 (Piaggio motor) personal aircraft and the S.11-S.14 series of trainers; the last-named type, recently described in these pages, is a side-by-side jet trainer.

Mr. M. Beeling.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Flying with Disabilities

IN your recent article "Torch to the Sky" (December 1st), S/L. "Cyclops" Brown is mentioned as having to fight a battle of "right against might" to prevent the authorities transferring him from active flying to the Secretarial Branch.

I am in a similar position in Holland, where our medical authorities take decisions which, in my opinion, only a qualified flying instructor should and can take. The R.A.F. gave me an A2B medical category (selected aircraft after practical flying tests) early in 1946.

In Holland we need another war to make people accept proven theories and practical experience. For instance, we have not yet got a separate Air Force.

I would be very grateful for information from any reader about cases of "disabled" persons who have flying licences and who are or were professional pilots whilst "disabled" (amputations, contact lenses, etc.).

In my own case my lower left leg is missing and I have done 900 hours' flying with (or, rather, without) it, my total time being about 1,400 hours. In England I have had all possible assistance from the president of No. 1 Central Medical Board, G/C. B. W. Cross, to whom I owe a lot.

As a matter of fact, H.R.H. Prince Bernhard is on my side, but "medical types" are very hard to convince.

Wassenaar, Holland. H. J. VAN OVERVEST, Flying Instructor.

Incentives

I WAS most interested in "Azimuth's" letter in your issue of January 12th, and at the risk of straying from aviation matters on to political ground I would venture to suggest that one reason for the "slackness" of which your correspondent complains is the lack of "incentive goods" available to workers.

In this connection, the comments of a British electrical-industry research team which recently visited the United States are not without interest. According to the *Daily Telegraph*, the team made these comparisons about the amount of work an "average workman" has to do to buy various consumer goods:—

Twenty cigarettes: 15 minutes in U.S.; 90 minutes in Britain.

Nylons: One hour in U.S.; six hours in Britain.

A gallon of petrol: 15 minutes in U.S.; one hour in Britain.

A suit: Three days in U.S.; three weeks in Britain.

The moral is too obvious to need any stressing.

I do think, however, in fairness to British aircraft-industry employees, it should be remarked that, quite often, the surroundings in which they work are far inferior to those of their American counterparts. I am not thinking of machinery, but rather of the "psychological" effect of modern, clean, brightly painted shops, good canteen facilities, etc. My own contacts with some sections of the industry have taken me into works reminiscent of "Black Country" factories of fifty years ago. Even where some measure of cleaning-up could be done quite easily and cheaply, employers seem to make no effort. This, to my mind, is the sort of slackness that breeds slackness. MERIDIAN.

London, W.1.

Synthetic Trainers

I HAVE read the notes on "B.O.A.C.'s Synthetic Trainer" under "Civil Aviation News" in *Flight* of October 27th with considerable interest, also F. W. Barling's letter in your issue of November 17th. As a co-inventor of some ten such trainers (incidentally the same as those Mr. Barling mentions), I feel that I can write with some authority and knowledge of the matter.

I endorse his point that this "new" American trainer is no new invention, even to noises, feel and snags. Fuel-consumption units were also fitted which emptied "tanks" at a rate varying with boost and r.p.m. settings, automatically cutting "engines" when empty, unless tank controls were changed over.

The trainers that were built during the 1942-45 period had control units electronically and electro-mechanically operated, and were fitted into actual cabins, therefore giving pupils a greater sense of reality and familiarity with the positions of every instrument and control. The "characteristics" settings of the units were carried out in close co-operation with the aircraft manufacturers, and also by data acquired from actual flying test flights.

Mr. Barling is a little conservative in his fuel-saving figures, as the actual amount saved whilst training over 20,000 aircrew personnel was 750,000 gallons, whilst the saving of lubricating oil was 3,000 gallons.

Considering that the estimated cost of these wartime trainers was in the region of about £5,000 each, it would appear that the £100,000 trainer of B.O.A.C. is somewhat expensive, notwithstanding the dollar expenditure for licence rights, etc., which must be considerable, especially during these days of dollar-saving.

The fact remains that in this country we still have the knowledge and ability to design and build this useful kind of synthetic type-trainer more economically and perhaps with an export market to earn dollars for ourselves.

Amongst the flying staffs of most civil aviation companies in this country to-day there doubtless are many who have had personal experience of these 1942-45 synthetic trainers.

Hemel Hempstead, Herts. R. A. M. THOMPSON.

Head-wind Posers

THE posers set by your correspondent Mr. W. E. Thompson in *Flight* of January 12th are academically interesting. He wants to know (a) exactly what happens in the hypothetical circumstance of an aircraft flying in still air at 200 kt and instantaneously encountering a sudden head-wind of 100 kt; and (b) whether the occupants would feel themselves jerked forward in their seats.

It seems to me that if the impossible conditions of an aircraft meeting an instantaneous head-wind are postulated then, equally, one may disregard the fact that the aircraft has inertia.

Imagining that the transition between stationary air and a head-wind of 100 kt has no dimension parallel to the line of flight, the effect on the aircraft would be nil, but the effect on the ground speed would be an instantaneous reduction by 100 kt. If, however, the aircraft is allowed to have inertia, the result of the transition would be an immediate but momentary increase in lift which, perhaps, would be compensated in part by an immediate but momentary coarsening of airscrew pitch in an effort to compensate the load relief on the blades; if, on the other hand, a jet aircraft were involved, a momentarily instantaneous increase in ram effect might be expected.

Further, the instantaneous increase of air speed—and if we allow that the aircraft represents an inert mass, such a change in air speed would be encountered—must of necessity bring with it an instantaneous increase in drag, the result of which would be to produce a complementary acceleration on everything embodied in the aircraft. The passengers would, therefore, be jerked forward in their seats.

London, S.W.5. C. H. FITZHARCOURT.

Safety Fuel

REFERRING to Mr. N. H. Mapperley's suggestion, in the January 5th issue of *Flight*, that some inert substance should be mixed with aircraft fuels for rendering them non-inflammable in tanks, there is an account of some work which has been done on this problem in the *Report of the Fire Research Board for the Year 1948*, which was published in the autumn of 1949 by H.M. Stationery Office. Experiments were carried out on aviation spirit and aviation kerosene with various volatile inhibitors added, with the idea that it might be possible to add an inhibitor in such a proportion that the vapour above the liquid would be rendered non-inflammable by a momentary source of ignition, while at the same time, when the fuel-plus-inhibitor was completely vaporized, combustion would still be possible. Unfortunately, the Report states, the concentrations of inhibitor required to produce an inert vapour were quite impracticable with aviation spirit, and of doubtful practicability with aviation kerosene.

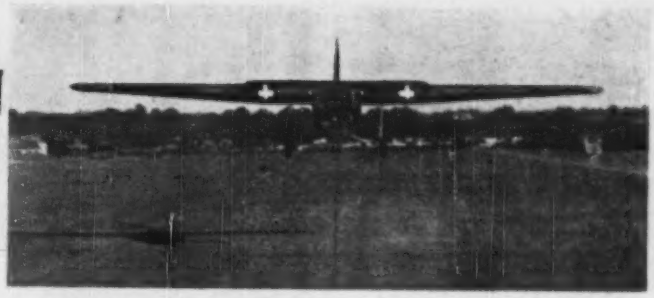
London, N.6. M. NEAL.

In Brief

Following the publication of a London reader's request for support in forming an aviation correspondence club and/or discussion group, G. W. Edwards (217, Highfields Street, Coalville, Leicester) would like to see something similar started in the Midlands.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements



MEASURE OF INDEPENDENCE : Although a glider cannot, of course, take off without outside assistance, it invariably clears the proverbial 50ft screen well in advance of the more heavily loaded tug aircraft. This new view of an Airspeed Horsa "unsticking" was secured from the rear turret of the towing Halifax during tests at Christchurch.

Chipmunk Deliveries

THE introduction of the de Havilland Chipmunk trainer into units of the R.A.F.V.R. has certainly been one of the most eagerly awaited events among Reserve pilots. Some time ago *Flight* announced that production of the new trainer, at Hatfield, was well ahead and that the R.A.F. had taken delivery of several machines.

The Air Ministry states that the order in which units will receive Chipmunks has been decided. Delivery is to begin this month as follows: Oxford University Air Squadron; Cambridge University Air Squadron; Reserve Command Instrument Training Flight, Honiley; No. 22 Reserve Flying School, Cambridge; Edinburgh University Air Squadron; University of London Air Squadron; No. 18 Reserve Flying School, Fairoaks; No. 1 Reserve Flying School, Panshanger; and Leeds University Air Squadron.

R.A.F. Appointments

THE Air Ministry announces that A.V.-M. W. L. Dawson, C.B., C.B.E., D.S.O., has been appointed R.A.F. instructor at the Imperial Defence College. Since October, 1948, A.V.-M. Dawson has been Commandant of the School of Land/Air Warfare at Old Sarum, and for two years previously was A.O.C., Air H.Q., Levant. He was formerly Director of Plans at the Air Ministry, where he served during the greater part of the war. Born in 1902, A.V.-M. Dawson was commissioned from Cranwell in 1922.

A successor to A.V.-M. S. F. Vincent as A.O.C., No. 11 Group, Fighter Command, has been announced: A.Cdre. T. G. Pike, C.B., C.B.E., D.F.C., who takes the acting rank of Air Vice-Marshal. A.V.-M. Pike spent last year as a student of the Imperial Defence College, and was formerly Director of Operational Requirements for two years.

During the war he served in the Directorate of Organization at the Air Ministry until early in 1941, when he was given command of No. 219 (Fighter) Squadron. Within a few weeks of taking command he was awarded the D.F.C. for his skill in intercepting enemy aircraft over this country at night. He destroyed one on his first patrol and soon afterwards he destroyed three more and was awarded a bar to the D.F.C. Later in the same year he went to 11 Group H.Q. as an air staff officer for night operation duties. A.V.-M. Pike, who is 43, was commissioned from Cranwell in 1925.

With the acting rank of Air Vice-Marshal, A. Cdre. W. E. Barnes, M.R.C.S., L.R.C.P., becomes Principal Medical Officer of Technical Training Command. Until recently he was Deputy Director-General of R.A.F. Medical Services.

It is also announced that G/C. B. C. Yarde, C.B.E., who commanded R.A.F. Station Gatow, Berlin, from July, 1947, until November, 1949, has been appointed Deputy Director of Personal Services (3) at the Air Ministry. This Branch is concerned with conditions of service as they affect the interests of airmen as individuals.

During G/C. Yarde's term as Station Commander, Gatow grew from a quiet airfield dealing with only a few passenger aircraft each day to the busiest airport in the world (at the height of the Berlin Air Lift it frequently handled more than 500 aircraft movements a day). His services were recognized by the award of the C.B.E. in the 1949 New Year Honours List. His predecessor as D.D.P.S. (3), G/C. R. T. Gething, O.B.E., A.F.C., has been appointed Group Captain in charge of operations and training at Headquarters, Far East Air Force, Singapore.

New "P.C." Regulations

RULES governing the selection of serving R.A.F. personnel for permanent commissions lay down that candidates, other than direct entry university graduates and cadets, will now be recommended once yearly.

Officers will be recommended before April 30th, and lists of those selected will be published early in October each year. Aircrew and regular airmen may be recommended at any time. Both officers and airmen who are university graduates serving on National Service engagements may apply for permanent commissions without waiting to be recommended, as in the case of direct entrants to permanent commissions from the universities. The normal upper age limit of 30 for officers, aircrew and airmen and the lower age limit of 25 for aircrew and airmen will not necessarily be applied rigidly for the time being.

W.R.N.S. Re-organization

FOLLOWING satisfactory reports on the work and capacity of W.R.N.S. aircraft mechanics, it has been decided that in future they will receive the same training and, so far as physical limitations permit, undertake the same duties in Naval air stations as men in the mechanic (A) and (B) categories of the Naval Airman Branch.

They will be classified as air mechanics

AERIAL GROUNDWORK : To encourage appreciation of the conditions under which pilots receive R/T communications, Wrens under training at the Naval Air Signal School, Lee-on-Solent, are given air experience in Naval Avro Ansons from Hamble. News of other W.R.N.S. trades in Naval Aviation is given on this page.

(airframes) and (engines). Advancement will be through the following ratings: Wren air mechanic 2; Wren air mechanic 1; leading Wren air mechanic; petty officer Wren air fitter; chief Wren air fitter.

Outstandingly efficient Wren air mechanics will have the opportunity of being selected for duty in the category of "pilot's mate." (Whereas air mechanics are trained to undertake specific jobs on large numbers of aircraft, the pilot's mate works on a single aircraft and remains with it while the aircraft is on the station. Their duties do not normally entail flying.)

Two-year Re-engagements

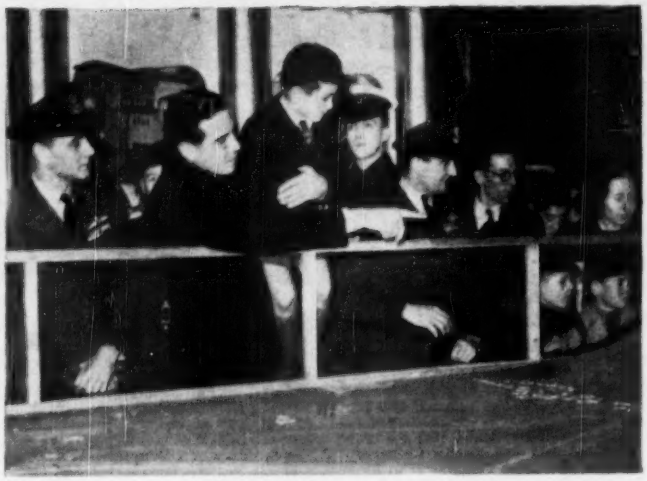
EX-AIRWOMEN who have had at least one year's previous Service in the W.A.A.F. or W.R.A.F. may now apply for re-entry on a shorter engagement of two years' regular service. Previously, the shortest period for which ex-airwomen could re-engage has been four years. The new engagement will be under the normal conditions of service, but only airwomen who can be accepted without further trade training will be eligible.

Naval Retirement

THE ADMIRALTY announces the retirement, dating from January 7th, of Capt. H. L. St. J. Fancourt, D.S.O. One of the most experienced of Naval Aviation specialists, Capt. Fancourt qualified in the first Fleet Air Arm pilots' course at Netheravon in 1924. Before 1939 he served, in various capacities, in a number of aircraft carriers, and was in charge of flying training at Lee-on-Solent at the outbreak of war.

In 1940 he was promoted to Captain and appointed to the command of H.M.S. *Sparrowhawk*, the Naval air base in the Orkneys. He was mentioned in despatches for organizing the reconnaissance flight that reported the sailing of the *Bismarck* from Bergen in May, 1942. In November of the same year he was in charge of a special force detailed to make a frontal assault on Algiers Harbour, and was awarded the D.S.O. in recognition of his leadership and courage on that occasion.

Capt. Fancourt commanded the aircraft carriers *Argus* and *Unicorn* in 1943 and 1944, and at the end of the war was Chief of Staff to the Flag Officer Carrier Training on the Clyde. From 1946 to 1949 he served at the Admiralty and Ministry of Supply as Director of Naval Aircraft Development and Production and Deputy Chief Naval Representative. Capt. Fancourt is still a competent pilot on most Naval aircraft, and in the summer of 1949 was awarded a certificate authorising flight clearance under I.F. condition (a green ticket).



OUTNUMBERED: Despite the pre-eminence (in this view at least) of adults, the Exhibition held recently at the Royal Horticultural Hall, Westminster, was nevertheless the Schoolboys' Own. One visitor with an expert guide was four-year-old Graham de Freitas, shown above with his father, the Under-Secretary of State for Air. Object of their attention was the R.A.F. exhibit, a model airfield.

TEST OF TIME: Officials of the Royal Greenwich Observatory's Chronometer Department at Hurstmonceaux check the waterproofing of some of the new Mk. II navigators' watches described in the adjacent paragraph.

New Watches for Navigators

A NEW, highly accurate wrist watch has been introduced to the R.A.F. for the exclusive use of navigators. Known as the Mark 11 Navigator Wrist Watch, it is of the highest grade obtainable in quantity production. For air navigation, watches must, of course, keep accurate time over long periods in varying conditions of altitude and temperature.

The movement of the Mk. 11 is housed in a watertight stainless steel case embodying an inner screen of soft iron; it is therefore unaffected by tropical conditions, high altitudes or strong magnetic fields. The dial is black with luminous markings and hands. A brake on the balance wheel stops the movement when the winding button is withdrawn to set the hands, facilitating synchronization.

The new instruments are tested and serviced by the Chronometer Department of the Royal Greenwich Observatory, Hurstmonceaux Castle, Sussex. The checking of each watch lasts for a fortnight and includes testing for two days in each of five positions, high- and low-temperature tests to check the accuracy of temperature compensation, and a test at reduced pressure equivalent to a height of 35,000ft to check the sealing of the case. Additional tests are undertaken on a small percentage of watches. As an indication of the accuracy required, it is stated that the mean of the daily rates noted in the five position-tests must be between 0 and 15 seconds' gain, and that the mean variation of the daily rate must not exceed four seconds.

Re-unions

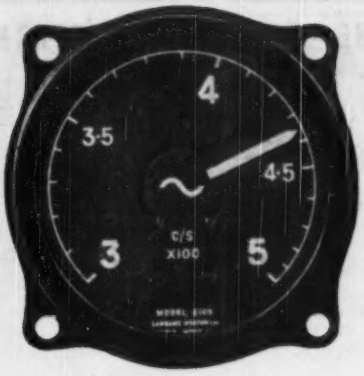
PAST and present members of R.A.F. Station Gravesend interested in a reunion are asked to contact L. J. Burchmore (ex-F/S, I/C M.T. Section, "Bookhams," Churt, Surrey.

* * *

The third annual reunion dinner of No. 1 S.F.T.S. (Ambala) will be held at the Chez Auguste Restaurant, London, on Saturday, March 25th. Details from Stan Booth, 70, Arbery Road, Bow, London, E.3.

* * *

A reunion for former personnel of No. 73 (Fighter) Squadron who served in the Battle of France (September, 1939, to June, 1940) will be held at the Royal Bell Hotel, Bromley, on Friday, January 27th. Details from H. Hall, 50, Westfield Road, Surbiton, Surrey.



A New Weston Frequency Indicator

THE Weston Model S109 is a new Frequency Indicator especially designed for aircraft use. It is of the ratiometer type and has a circular scale having an angle of 270° and a length of 5¼ inches. This indicator is made for all standard aircraft voltages and normally indicates frequencies between 300 and 500 c.p.s. A feature of the indications is that they are independent of wave form and any normal variations in the supply voltage. The readings are accurate to within ± 1 per cent. of the maximum indicated frequency. The Indicator is unaffected by external magnetic fields and it is shielded against compass interference. It is entirely self-contained and is supplied in a standard bakelite aircraft case for panel mounting.

WESTON
Aircraft Instruments

SANGAMO WESTON LIMITED
ENFIELD · MIDDLESEX
Telephone: ENField 3434 (6 lines) & 1242 (5 lines)

B T-H

ELECTRICAL EQUIPMENT FOR AIRCRAFT

includes:—

Magnetos;
D.C. & A.C. Generators;
Motor Alternators;
Rotary Converters;
Amplidynes;
D.C. & A.C. Motors;
Gear-boxes & Gears;
Engine Starters;
Actuator Mechanisms;
Electronic and other Control Gear;
Speed Indicators and Speedometer Calibrators;
Mazda Aircraft Lamps for landing, navigation, interior lights and fluorescent lighting for cabins.

Specify

BTH

ELECTRICAL EQUIPMENT

BRITISH THOMSON-HOUSTON
THE BRITISH THOMSON-HOUSTON CO. LTD. COVENTRY, ENGLAND

'FLEXELITE'

FLEXIBLE FUEL TANKS

are made from

'FLEXSYN'

a new synthetic rubber material carefully compounded to have exceptional low temperature resistance with all types of fuel. Bonded to nylon for added strength, it is made in two thicknesses, 0.020" and 0.045".

'FLEXELITE' TANKS, with their continuous lining of tough elastic synthetic rubber, withstand very severe shocks, such as occur in forced landings, thus minimising fire risk.

Our Technical Department will be glad to discuss further advantages.

A.R.B. & M.O.S. APPROVED

MARSTON EXCELSIOR LIMITED

(A subsidiary company of Imperial Chemical Industries Ltd.)

ICI

FORDHOUSES, WOLVERHAMPTON

Telegrams "ICIMAREX" WOLVERHAMPTON. Tel: FORDHOUSES 2181

MAR.75

THE BRISTOL AEROPLANE COMPANY LIMITED

have vacancies

AT BOTH THEIR

LONDON & BRISTOL DESIGN OFFICES

for

DETAIL DESIGNERS

SENIOR DRAUGHTSMEN

and

INTERMEDIATE DRAUGHTSMEN

with Aircraft or general Light Engineering experience and preferably with Higher National Certificate or equal qualifications in engineering.

ALSO

in their TECHNICAL OFFICE at Bristol

for

SECTION LEADERS

with qualifications and experience in Structure Design and Stress Analysis, capable of controlling individual projects.

Applications for all vacancies, stating age, qualifications and previous experience, should be addressed to:—

THE STAFF AND LABOUR MANAGER,
THE BRISTOL AEROPLANE CO. LTD. (Aircraft Division),
FILTON HOUSE, BRISTOL.

R.J. COLEY & SON (HOUNSLOW) LTD.

HOUNSLOW 2266

FOREMOST SCRAP METAL MERCHANTS TO THE AIRCRAFT INDUSTRY

All grades of scrap aluminium & other non-ferrous metals

Keenest prices · First-class service

Also at TAME ST., STALYBRIDGE

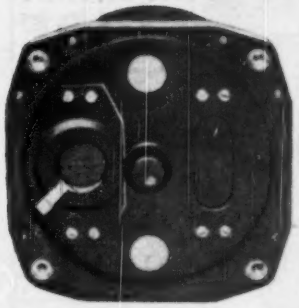
STALYBRIDGE 2217

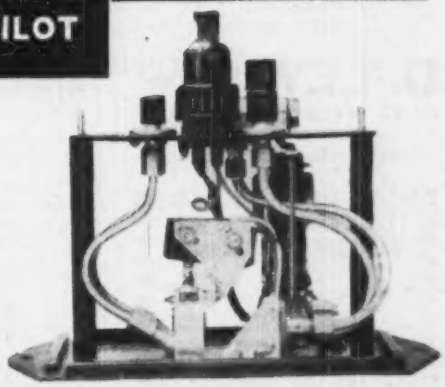
THE BASIS OF THE GRAVINER FIRE PROTECTION SYSTEM

The copper cylinder, pressure tested to a high safety factor, forms the basis of our fire protection system . . . and Graviner cylinders embodying more than a decade of specialised experience, have been developed to the highest standards of reliability and efficiency. Such intensive development, for instance, ensures that hand-operated extinguishers can easily be removed, used and replaced with one hand . . . that the extinguisher is always ready for immediate use. In the case of cylinders forming part of complete systems operated by crash or pyrotechnic switches, it ensures that the extinguishant flows only when it is required to—that it then flows at very high speed. Full details of Graviner Extinguishers will gladly be supplied on request.

GRAVINER AIRBORNE FIRE PROTECTION EQUIPMENT
POYLE MILL WORKS, COLNBROOK, BUCKS. *Tel.: COLNBROOK 48.*

SAFETY CUT-OUT-AUTO PILOT





Safety for your Aircraft.
Complete immunity from Auto-pilot failure worries.
Pilot's best friend.

A.R.B. HEIGHT & SPEED restrictions removed when installed in Aircraft.

Send for our illustrated Brochure.

ANCILLARY DEVELOPMENTS Ltd

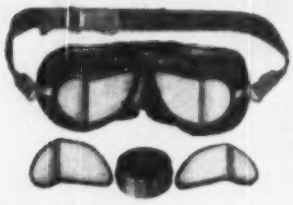
BLACKBUSHE AIRPORT
Telephone Camberley 1437 1438

FLIGHT

CLASSIFIED ADVERTISEMENTS

Prepaid Advertisement Rates: 3/- per line, minimum 6/-, average line contains 6-7 words. Special rates for Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders, 6/- per line, minimum 6/- per paragraph. Box Number facilities available for the convenience of private advertisers, add 2 words plus 1/- to defray the cost of postage and forwarding replies. Press day, FIRST POST THURSDAY, or one day earlier at Branch Offices. No responsibility accepted for errors. Remittances payable to "Flight Publishing Company, Dorset House, Stamford Street, London, S.E.1.

FLYING EQUIPMENT



Brand new Mark VIII **GOGGLES, 24/6.** Spare lenses tinted or clear, **3/6.** Brand new latest type ex-R.A.F. anti-glare sun spectacles, **21/-.** Luxury Goggles, **50/-.** ¾-length Black or Tan leather **FLYING JACKETS,** Zip front, all-round belt, **£10 14 6.** Brand new ex-R.A.F. Outer Flying suits, **45/-.** Black or Tan sheepskin lined all leather **FLYING BOOTS, 66 4/-.** Ex-R.A.F. Flying Gauntlets, strong supple cape leather, fleece lined, **22/6.** Electrically heated INNER GLOVES, **7/9.** Pure White silk underglovers, **4/9.** Oulton Compasses, **50/-.** Fully sheepskin lined Tan leather **GAUNTLETS,** strap wrist, **30/-.** Genuine ex-R.A.F. Irvine **JACKETS,** sheepskin or fur lined now in stock. American white **LAMBSWOOL LINED FLYING JACKETS.** First class selection from **100/-. WHITE FLYING JACKETS** now in stock. Zip front, cuffs and ankles. All-round Belt. In good quality white drill. Specially cut for smartness and comfort. **79/10.**

SPECIAL QUOTATION MANUFACTURERS AND FLYING CLUBS.

All goods sent Post Free.

QUICK SERVICE SPECIAL TERMS TO FLYING CLUBS—SECRETARIES, WRITE FOR PARTICULARS NOW.

Send 1d. in stamps for NEW CATALOGUE.

TRADE SUPPLIED

D. LEWIS LTD. (Dept. F.)

124, GT. PORTLAND ST., LONDON, W.1

Tel.: Museum 4314. Tels.: Aerofit, Wesdo, London

THE FUNDAMENTALS OF GAS TURBINE TECHNOLOGY

by

W. R. Thomson, B.Sc.Tech., A.M.Inst.C.E.

THE TEXT BOOK OF THE SCHOOL OF GAS TURBINE TECHNOLOGY

First print limited

Price 25s. 26s. post free in U.K.

POWER JETS (RESEARCH & DEVELOPMENT) LTD.

13 Green Street, London W.1

AIRCRAFT FOR SALE

FIELDS

LIGHT Aircraft.—We have a large selection to offer including all popular types.

FAIRCHILD Argus.—Only £250 "as is." An opportunity to secure an excellent aircraft at a really cut price.

AEROVAN.—Another give-away at £450 including spare engine, radio, etc.

DAKOTAS.—Passenger or freighter available ex stock completely overhauled.

PRATT & WHITNEY Series 1830 engines supplied immediately. Also many spares.

WRITE for details. Flood Aircraft Services, Ltd., Croydon Airport, Surrey. Tel.: Croydon 7777. Cables: Fieldair, Croydon. [0258

NOTE on your pad:—

R. K. DUNDAS, Ltd.

AEROPLANES

AIRCRAFT spares

AERODROME equipment.

BOMBAY, Johannesburg, Karachi.

R. K. DUNDAS, Ltd., Aviation Division, 3, St. James's St., London, S.W.1. Whitehall 2648. Cables: Dundassco, London. [0558

WE invite offers for:—

AUSTER Autocrat.—Only 60 hours since new; 6 months C. of A.; excellent condition.

AUSTER Autocrat.—Very good condition; C. of A. expired but can be renewed if required.

TAYLORCRAFT Plus D Model "D."—12 months C. of A.; very fine aircraft.

AUSTER J/4.—Fitted with steerable tail wheel.

PERCIVAL Q.6.—Very comfortable aircraft; seating accommodation for 5 passengers; luggage compartment; cruising speed 140 m.p.h.; 12 months C. of A.

THE YORKSHIRE AEROPLANE CLUB, Sherburn-in-Elmet, Yorks. Tel. South Milford 578-9. [4471

MARK I Anson ex-R.A.F. but fully modified; cheap to clear.—Box 0374. [0560

£395—Proctor aircraft, choice of nine, with or without C. of A.

£275—Tigermoths, with or without C. of A.

£275—Miles Magisters, etc.

VENDAIR, Croydon Airport. Cro. 5777. [4511

DOVE executive model in new condition, can be inspected and demonstrated any time; best offer secures.—Box 1642. [0579

PERCIVAL Proctor V, as new, with C. of A., choice of 2, one with very low engine hours, from £600.—Full details from Box 1530. [4490

£375—Fairchild Argus, long-term C. of A., reupholstered and sound-proofed; a magnificent 4-seat aeroplane.—Box 0372. [0561

ONE of the best Proctor I aircraft in splendid condition, privately owned; no reasonable offer refused.—Tel.: R. O. Nicholson, Hounslow 2552. [4514

WE are instructed to offer for immediate sale on behalf of His Highness the Maharaja of Baroda his luxurious executive-type Dakota long-range aircraft.—Air Couriers, Ltd., Croydon Airport, Surrey. [4529

A SUPERBLY fitted Anson Mk. I for sale, 8 passenger seats, upholstered and soundproof, by Rumbold; long-term C. of A.; radio VHF.TR.1145 and T.R.1154/55, readily convertible as a freighter; nearest offer to £1,200.—Box 0370. [0559

ANSON Mark I freighter, early delivery with 12 months C. of A.; fully modified with low hours both aircraft and engine, T.R.1154/55; radio; payload 1,045 lb; £905 or near offer; others available with or without C. of A.—Box 0371. [0562

TAKE YOUR COURSE WITH THE T.I.G.B.

the Professional Engineering and Aeronautics Tutors whose home-study students have won OVER 50 FIRST PLACES

Examination Courses for:	*Diploma Courses in:*
A.F.R.Ae.S. Licences A,B,C,D A.M.I.Mech.E. A.M.I.E.E. A.M.I.C.E. A.M.I.P.E. B.Sc., C. & G. Etc.	All Branches of ENGINEERING and AERONAUTICS (Industrial and Operational)

★ *Write to-day to the T.I.G.B. as follows:*

Ask for free copy of "The Engineer's Guide to Success"—200 courses—and state for which examination you are a candidate or in which branch you wish to gain a diploma.

The Professional Engineering & Aeronautics Tutors.

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN

37 TEMPLE BAR HOUSE, LONDON, E.C.4

IMPORTANT GUIDE

This unique handbook "Engineering Opportunities," outlines over 200 home-study Courses of technical instruction, including **Aeronautics, Engineering, Aeronautical Design, Aero Engines, Air Navigation, Aircraft Engineers' Licences (Ground Engineers), A.F.R.Ae.S., A.M.I.Mech.E., R.A.F. Maths.,** etc. Our courses have been approved by the **Royal Aeronautical Society** and

WE GUARANTEE

"NO PASS—NO FEE"

A copy of this enlightening guide to well-paid posts will be sent on request—**FREE.**

British Institute of Engineering Technology

306, Shakespeare House, 17-19, Stratford Place, London, W.1.

B.I.E.T.

Jubilee **PATENTED WORM DRIVE CLIP**

the finest CLIP in the world

L. ROBINSON & CO. (GILLINGHAM) LTD.

Gillingham, Kent

AIRCRAFT FOR SALE

W S SHACKLETON, Ltd., 175, Piccadilly, London, W.1.

EUROPE'S leading aircraft dealers, optimistic as ever, have high hopes that 1950 may be a healthy and progressive year for Civil Aviation. We feel that Civil Aviation rather needs such a year and hope that you will all agree with us.

AS ever we have a fine stock of excellent aeroplanes roaring to go, the sun is shining, the birds are singing, and . . . Oh, oh! Sorry, it's Q31. Never mind, you are not all fortunate enough to be living in the London Control Zone.

ESPECIALLY for overseas customers, let us give you on request, C.I.F. quotations for any aeroplane delivered anywhere.

CEMINIS.

GMESSENGERS.

AUSTERS

APROCTORS.

DAKOTAS.

CONSULS.

NIXONS.

AHOVANS

WE have also two fine Parachutes at £3 0 each or offer.

SEE also our advertisements under "Aircraft Wanted" and "Engines for Sale."

W S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. Tel.: Regent 2448-9. Overseas Cables: "Shackbud, London." [0070

FOR export only, 1946 Beechcraft Bonanza, long range tank, Motorola 6-channel V.H.F. night flying equipment, Sperry panel, all cabin comforts, spares and tools valued £150; flying time since new negligible, a beautiful aeroplane—what offers?—Box 1655. [4517

AUSTERS! Austers! Austers!—If you want a really good used Auster write or 'phone us. We, as the makers, only sell the best used aircraft for whose condition we can vouch.—Auster Aircraft Co., Ltd., Rearsby, Leicester. Tel. Rearsby 276, Gaddesby 271. [0454

AIRCRAFT WANTED

W S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1.

EUROPE'S biggest dealers in used aircraft, are always in need of new or used civil aeroplanes of all types for resale. We will either buy your machine for cash, sell it for you on a modest commission basis, or take it in part exchange for another aeroplane. We offer you unrivalled service.

W S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. [4525

PRIVATE owner requires Messenger in first-class condition, for cash, with all mods. and C. of A.—Box 1630. [4515

AIRCRAFT ACCESSORIES AND ENGINES

BATTERIES! New 12v D type (Proctor, etc.), complete lid, carrier, etc.; £6/10, carriage paid.—Staravia, Blackbushe Airport, Camberley, Surrey. [0569

LITCO FLIGHT AIDS, Station Approach, Boxmoor, Herts.—British & American aircraft instruments and electrical accessories from stock.—Tel. Boxmoor 1564. [4550

W S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. are in a position to offer what are probably the only two brand new D.H. Gipsy Queen III engines in the country. A special offer—complete £350 each. [4526

LARGE stocks for disposal of D.H. Queen Bees, Ils and Is, Cheetah IX and X Gipsy Majors, Lycomings, Cirrus, etc.; hours varying from nil since new.—Rollason Engines Ltd. Croydon Airport. Tel. Croydon 5151. [0576

AIRCRAFT SPARES.—Cabin (electrical & control); paints, dopes, fabric; instruments—Airframe, engine and propellor spares for Anson, Fairchild, Hornet Moth, Tiger Moth, Moth Minor, Proctor, Q.6, Auster; wide range A.O.S. spares—all material new and released; send us your requirements. Keenest prices.—Western Airways, Airport, Weston-Super-Mare 2720. [4461

AIRCRAFT ACCESSORIES AND ENGINES WANTED

DAKOTA power plant spares.

PP & W engines 1830 92 and R985 AB10.

PP & W engines 2000 series

LYCOMING engines and spares.

GGIPSY Major and Queen IIs.

AIRCRAFT plugs, all types wanted by Vendair Aircraft, Croydon Airport. Cro. 5777. [4510

AIR CHARTER

FLIGHTWAYS, of Southampton Airport, charter fleet always available.—Tel. Eastleigh 87660. [4378

BROOKLANDS AVIATION, Ltd.—Proctors and Rapides available for air charter at Brooklands Aerodrome, Weybridge (Tel. Byfleet 486); Sywell Aerodrome, Northampton (Tel. Mculton 213511); Shoreham Airport, Sussex (Tel. Shoreham 2366). [0509

AIRCRAFT FOR HIRE

THOMAS BARCLAY, Ltd., offer Anson, Consul, Rapide aircraft for hire on contract, at £3 per hour.—177, Sloane St., S.W.1. Tel. 6171 Sloane. [0425

THE DE HAVILLAND AIRCRAFT COMPANY LIMITED

have the following vacancies in their

HATFIELD & LONDON DESIGN OFFICES

HATFIELD :-

SENIOR DESIGNERS with experience in controlling the design of Aircraft major components.

SENIOR STRESSMEN with minimum of five years' experience in stress analysis of Aircraft Structures.

DETAIL DESIGNERS and INTERMEDIATE DRAUGHTSMEN

Assistance will be given to obtain local living accommodation.

LONDON :-
(Regent Street)

SENIOR and INTERMEDIATE DRAUGHTSMEN with Aircraft experience preferred. Consideration will be given to applicants experienced in light mechanical engineering.

Applications for **HATFIELD** or **LONDON** vacancies should state experience, age and salary required and be addressed to :—

The Chief Draughtsman,
The de Havilland Aircraft Co., Ltd.,
Hatfield, Herts.

Aero & Jig & Tool Draughtsmen in Great Demand

MEN AND YOUTHS

There is an insatiable demand for Aero, Jig and Tools, etc., Draughtsmen and Inspectors. So acute is the present shortage that employers are only too anxious to engage those with no previous practical experience who are able to prepare neat and accurate drawings.

QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—under tuition at home in your spare time—**YOU** can secure an attractive and interesting post as **Aero-Draughtsman.** Numerous vacancies are also available in **Electrical, Mechanical, Plastics,** etc., branches of Draughtsmanship.

FREE GUIDE

The Free Guide contains 192 pages of information of the greatest importance to those seeking such success compelling qualifications as **A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., A.M.I.E.E., Hndrc. and B.Sc.,** etc., also **R.A.F. Entry** (Maths., etc.), together with particulars of our remarkable Guarantee of

SUCCESS—OR NO FEE

Write now for your copy of this remarkable publication. It may well prove to be the turning point in your career.

NATIONAL INSTITUTE OF ENGINEERING

(Dept. 487), 148-150, HOLBORN, E.C.1
(South Africa Branch E.C.S.A., P.O. Box 6417, Johannesburg.)

AIRCRAFT SERVICING

FOLLOWING derequisition, hangar space now available at Portsmouth Airport.

APPLY Airport Manager, Portsmouth 3741. [4477

FLIGHTWAYS for C. of A. overhaul, repairs, etc.; competitive prices.—Southampton Airport. Tel. Eastleigh 87660. [4377

BROOKLANDS AVIATION, Ltd., Brooklands Aerodrome, Weybridge.—C. of A. overhauls, modifications and conversions. Tel. Byfleet 486. [0505

REPAIRS and C. of A. overhaul for all types of aircraft.—Brooklands Aviation, Ltd., Civil Repair Service, Sywell Aerodrome, Northampton. Tel. Moulton 3291 [0507

BOOKS WANTED

WANTED, old issues Jones "Aircraft"; aviation books, etc., for sale.—Box 1704. [4532

CARAVANS

LET a "Bonnaom" brighten your life—on the supers 22ft. 6-room, £868 Rollalong Living Van at the South West Distributors, the Pathfinder Caravan Co., Ltd., Fedburn St. Mary, nr. Exeter. C.D.A.A. Member. [0578

CARAVAN homes! Largest selection! Incomparable values! Immediate or early delivery! All 1950 models! All 7½ft. wide! Beautifully furnished! £598, Berkeley Courier, 17½ft; £466, Haven Cottage, 15ft; £750, Championship Manor, 22ft; £795, Berkeley Ambassador, 22ft; twelve other leading makes from £150, all on view now.—Staffords, Specialists, Kirkheaton, Huddersfield. Tel. 6616. Always open. H.P. terms. [4519

A CARAVAN or an aquarium? Both spell disaster to their owners if they leak! That's why ex-editor caravan paper with Britain's largest selection gives his unique free-van-for-a-faulty-one offer! Better hire purchase terms too and many more vans to choose from; so why not write for helpful advice articles and brochures to Head Office, A. E. Jenkinson, Bath Rd., Taplow, Bucks. Tel. Maidenhead 2610. Open always. Easy to reach—right on Main A.4, Taplow Station 4 mins. walk.

LONDON Branch (with ex-R.A.F. manager), corner of Bury St. and Bentley Place, Victoria, S.W.1. Open 9 a.m. to 7 p.m. daily, including Sunday.—Tel. Sloane 9233. (Just behind Airways House in Buckingham Palace Rd. Victoria Station 4 mins. walk.) [0270

THE Adj. could P.O.R. your living-out allowance at once—if you had somewhere to live—and you can have a caravan immediately from F.O.C. Caravan Centre. Make a selection from the 40 new and little-used caravans on view. Hire-purchase facilities available and we can tow the selected caravan to your site. Call during your next 48 and let us discuss the idea. We have fixed up many R.A.F. types who say it's just the job. Full details gladly sent on receipt of a postcard.

F.O.C. CARAVAN CENTRE, 362, Cricklewood Broadway, London, N.W.2. Gladstone 2256. Open 8-5.30. Sundays by appointment [0307

CELLULOSE

CELLULOSE auto and industrial grades, synthetics, flocks, decorative paints, upholstery, cellulose strippers, etc. (at. 1d.) Goods despatched same day; plant hired.—Leonard Brooks, Harold Wood, Essex. Ingrebourne 2560. [3365

CLUBS

REDHILL FLYING CLUB.

LEARN to fly amidst delightful surroundings at Redhill Aerodrome, Surrey, South London's nearest flying centre, 25 miles from Hyde Park Corner, 52 minutes from Victoria Station; flying training on Austers and Magisters, £5/10 dual, £5 solo, per hr., Instructors' flying, Instructors' B licence courses, attractive club-house with full catering facilities.—Tel. Nutfield Ridge 2245-2234. [0547

HERTS & ESSEX AERO CLUB, Broxbourne Aerodrome, Naseing, Essex; train from Liverpool Street or Green Line Route 715 from Broadmeating House; trial lesson, half an hour for 30/-.—Tel. Hoddesdon 2468 and 24221. [0230

BREVET FLYING CLUB.—Fully licensed residential clubhouse, excellent food, membership now exceeds 10,000, meet the flying types at the "Brevet"; membership £1/1 p.a.—Secretary, 11, Chesterfield St., Mayfair, W.1. Gro. 1555. [0592

LEARN to fly for £24; instructors' licences and instrument flying £5 an hour; night flying £5/10 an hour; residence 4½gns weekly; approved M.C.A. private pilot's licence course.—Wiltshire School of Flying, Ltd., Thruxton Aerodrome, Andover, Hants. [0259

DENHAM AERO CLUB.—Fully licensed clubhouse, good food, beautiful swimming pool; 40 minutes' from Marylebone Station; flying rates from £2/15 dual, £2/5 solo, per hour; average dual 10 solo 6 hrs; aircraft Piper Cubs, Austers, Magisters, Taylor Cub, 25/- per hour solo; fly yourself hire and charter.—Tel. Denham 2161. [0409

CONSULTANTS

WING COMMANDER R. H. STOCKEN, F.R.Ae.S., Eagle House, 109, Jermyn St., London, S.W.1. Tel. Whitehall 9065 [0419

HOTELS AND ACCOMMODATION

ROYAL OAK HOTEL, Keswick-on-Derwentwater, the heart of English Lake District, offers restful holiday to Air Force personnel; first-class accommodation at reasonable charges. [0414

INSURANCE

ALL types of aircraft insurance and personal accident cover.—Apply to J. W. T. Avey, Messrs. H. J. Moffatt & Co., Percy House, 796, High Rd., Tottenham, N.17. Tottenham 2008-4-5. [0584

MISCELLANEOUS

R.A.F. and R.N. officers' uniforms purchased, large selection of R.A.F. officers' Kit for sale, new and second-hand.—Fisher's Service Outfitters, 66-68, Wellington St., Woolwich. Tel. Woolwich 1088. [0567

PACKING AND SHIPPING

R. & J. PARK, Ltd., 143-9, Fenchurch St., E.C.3. Tel. Mansion House 8083; official packers and shippers to the aircraft industry. [0012

TIME RECORDERS

TIME recorders; service rental.—Tel. Hop 259. Time Recorder Supply & Maintenance Co., 157-159, Borough High St., S.E.1. [4428

TYRES

SHARMANS TYRE SERVICE.—Guaranteed deep tread remoulds, Firestone or Goodyear pattern.

3 50-19 30/6; 4.50-19, 42/6; 4.75/5.00-19, 50/-; 5.25/5.50-19, 57/9; 6.00-19, 72/6; 7.00-19, 88/6; 4.00-16, 36/6; 4.50-16, 41/9; 4.75/5.00-16, 49/-; 5.25/5.50-18, 54/9; 6.00/6.50-18, 73/9; 7.00-18, 78/9; 4.00-17, 34/6; 4.50-17, 41/3; 4.75/5.00-17, 46/-; 5.25/5.50-17, 51/9; 6.00/6.50-17, 67/3; 4.75-16, 38/9; 5.00-16, 40/-; 5.25-16, 47/-; 5.50-16, 50/9; 5.75-16, 54/-; 6.00-16, 58/-; (Special Jeep Covers, 70/-); 6.25/6.50-16, 66/9; 7.00-16, 71/9; 7.50-16, 89/3; 5.00-20, 52/6; 5.25/5.50-20, 58/6; 6.00-20, 60/-; 4.75/5.00-21, 53/9; please write or 'phone for quotations on all other sizes; despatch by first passenger train 2/6 per tyre extra.—Sharmans, Lanark Rd., Maida Vale, W.9. Cunningham 7521-2. [0572

TUITION

THE LONDON SCHOOL OF AIR NAVIGATION provides full or part-time coaching and postal courses for all pilots' and navigators' licences.

'A' licence, short courses commence each Tuesday.

BROCHURE on application to

62 Gt. Cumberland Place, W.1. Pad 4405. [0277

AIRCRAFT or automobile engineering. Complete practical and technical training for entry to either industry.—Syllabus from Bursar, College of Automobile and Aeronautical Engineering, Sydney St., Chelsea, S.W.3. Flaxman 0021. [0019

ENGINEERING Courses.—Skyways, Ltd., are now re-holding ground engineers' courses on Skymasters, Dakotas, Yorks and Lancastrians, fees for practical and classroom instruction £10 per month.—Contact Supt. of Training, Skyways, Ltd., Dunsfold, Surrey. [0446

SCHOOL OF NAVIGATION, University College, Warsash, Southampton; flight navigators' course, £16 for nine months' tuition; pilot licences £7-£15 for six months' tuition; Link instruction; all approach procedures 10/- per hour or £3 10 for ten hours; postal courses; hall of residence. [0557

CIVIL Aeronautical training in all its branches can be obtained at Britain's air university, to which students come from all over the world; flying, navigation, radio and engineering to the very highest internationally recognised standards.—For full particulars apply The Commandant, Air Service Training, Hamble, Hants. [0327

WIRELESS.—Youths 15 upwards, trained for good posts as radio officers, vacancies now available comm. salaries (air) £550, (marine) £240 all found; also short conversion course for 1st class Flight R.O.'s licence, day attendance, boarding arranged.—Dept. "P," London Telegraph Training College, Ltd., 20, Penywern Rd., Earl's Court, London, S.W.5 (Tel. Flaxman 6721). Est. 1898. [0299

SOUTHEND MUNICIPAL FLYING SCHOOL. 'Phone Rochford 56204.—No entrance fee, no subscription, M.C.A. approved for 50-hour course for Private Pilot's licence; Auster Tiger Moth and Proctor aircraft; solo from £2/15 per hour, dual from £3 per hour; Austers and Proctor fitted with V.H.F. radio; special winter rates for night flying, solo, £3 per hour, dual £5 10 per hour; Link Trainer, 10/- per hour; courses for R.T. operator's licence and instructor's endorsement; flying training to Commercial licence standard; restaurant and residential accommodation. [0352

SITUATIONS VACANT

Vacancies advertised are restricted to persons employments excepted from the provisions of the Control of Engagement Order 1947.

AIRWORK, Ltd., have vacancies for the following personnel for employment in South West Wales:—

EXPERIENCED Mosquito instructors with B1 category, minimum requirement.

FITTERS and riggers with good experience on Mosquito or similar type.

WRITE giving full particulars to Airwork, Ltd., Sutton Lane, Langley, Bucks. Envelopes to be marked Flying Training. [4520

SENIOR Methods Engineer required, experience of modern methods of aircraft construction essential, must be capable of controlling staff.

APPLY to: The Personnel Manager, The De Havilland Aircraft Co., Ltd., Broughton, Chester. [4521

LECTURER required, strength of materials, theory of structures, and applied heat; degree standard; permanent post Central London.—Box 1706. [4534

SITUATIONS VACANT

SHORT BROTHERS & HARLAND, Ltd., BELFAST, NORTHERN Ireland.

HAVE vacancies in their design office in Belfast for:—

EXPERIENCED aircraft stressmen, senior and junior, preferably with experience on metal aircraft.

EXPERIENCED aircraft draughtsmen, senior and ordinary grades, senior draughtsmen should have sound practical design experience and be capable of detail stressing.

SELECTED applicants living in England will be interviewed either in London or convenient to their place of residence.

DETAILS of housing accommodation available and facilities for removal will be supplied at the time of interview.

APPLICATIONS, giving age, details of experience and qualifications, etc., and salary expected, should be addressed to Short Brothers & Harland, Limited, 17, Grosvenor Street, London, W.1. [0562

VICKERS-ARMSTRONGS, Ltd., Weybridge Works, Weybridge, have vacancies for the following technical staff:—

DRAUGHTSMAN, senior and junior, with aeronautical or mechanical experience, for design of aircraft structures, etc.; pension and life assurance scheme applies.

TRACERS (female), of several years' experience on mechanical work; pension and life assurance scheme applies to female employees of 25 years of age and over.

MOULD fitsmen, with experience on aircraft work, pension and life assurance scheme applies.

APPLY to Employment Manager, Weybridge Works. [0565

SENIOR draughtsmen are required in the following categories for work in connection with propellers for piston and turbine engines:—

JIG and tool—experimental propellers.

PROPELLER tooling—installation, stripping and assembly, flight kits.

DESIGN—test bed requirements, test rigs and associated equipment.

APPLICANTS should be qualified by apprenticeship and 4 years' subsequent experience.

CALL or write, stating age, experience and salary sought, to Personnel Manager, de Havilland Propellers, Ltd., Manor Rd., Hatfield. [4481

THE DE HAVILLAND AIRCRAFT Co., Ltd., Broughton, Chester, require Aircraft Inspectors for metal components, assembly line and final inspection. [4522

VACANCIES.—Four Senior Draughtsmen, must have had considerable experience on airframes and equipment.—Apply writing, Chief Designer, Hellyells, Ltd., Walsall Airport. [4496

FLYING Instructors Staff Pilots required for Reserve Flying School; preference will be given to those with (a) E.F.T.S. instructing experience, (b) twin-engine experience.

APPLY for particulars to the Manager, No. 9 Reserve Flying School, Ellers Rd., Doncaster. [4502

CLERK-LIBRARIAN required, accustomed to dealing with drawings and technical publications.—Please apply in writing to Aircraft Materials, Ltd., Midland Rd., London, N.W. [4488

APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.

APPLICATIONS should state full particulars of experience and qualifications and should be addressed to The Personnel Manager, The de Havilland Engine Co., Ltd., Stonegrove, Edgware, Middx. [0575

DRAUGHTSMAN experienced aircraft or automobile design, general engineering an advantage; Higher National Certificate; good salary; 5-day week.—Apply Personnel Manager, Le-Rhead, Leamington. [4462

GLOSTER AIRCRAFT Co., Ltd., require first-class aircraft draughtsmen; apply in writing, giving full details of experience and qualifications to—Employment Officer, G. A. C. Ltd., Hucclecote, Glos. [0577

REQUIRED, jig and tool designer draughtsman with good knowledge of modern production requirements. Experience in the design of 5 dimensional cams and turbine blades would be an advantage; young and keen man preferred.

APPLICANTS to furnish details of age, qualifications and experience and approximate salary required to Industrial Relations Department, Ruston & Hornsby, Ltd., Lincoln. [4525

SENIOR stressmen required, must be experienced and with academic qualifications; permanent post with good pay and superannuation, only first-class men will be considered.—Apply to Chief Designer, Hawker Aircraft, Ltd., Kingston-on-Thames. [4457

DESIGN Engineers required by the Hymatic Engineering Co., Ltd., for work on high pressure pneumatic aircraft systems. Higher National standard with apprenticeship or equivalent practical experience; experience in aircraft industry desirable.—Apply to Personnel Officer, H.E.C., Redditch. [4516

THE FAIREY AVIATION Co., Ltd., Hayes, Middlesex, U. requires several draughtsmen capable of dealing with a variety of intricate structural problems on fixed and rotary wing aircraft; there are also vacancies for a few less experienced assistants.—Apply in writing to Personnel Manager. [4576

DRAUGHTSMAN required for aircraft dinghy development and similar projects; knowledge of proofed fabrics and aircraft installations desirable but not essential; factory situated in the S.W. outer London area.—Applications, giving full details of experience and salary required to Box 1703. [4531

SITUATIONS VACANT

THE BRISTOL AEROPLANE Co., Ltd., invite applications for the position of chief training officer, to co-ordinate their extensive training facilities and to extend the schemes of training for technical, commercial and supervisory staffs; practical industrial experience and good educational qualifications are essential.

APPLICATIONS in writing, stating age, qualifications and present salary, should be addressed to the Chief Personnel Manager, The Bristol Aeroplane Co., Ltd., Filton House, Bristol. [4509

APPLICATIONS are invited from senior and intermediate design draughtsmen, experience of aero engine design desirable, but not essential; please write stating age, and giving details of previous experience in chronological order, to—The Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [0449

APPLICATIONS are invited from senior stressmen with first-class qualifications desirous of working on new project of most interesting kind; excellent prospects of advancement for candidates with experience and enthusiasm.—Apply, giving experience, qualifications and salary required, to Chief Technician, Gloster Aircraft Co., Witcombe, Glos. [0440

ENGINEER required primarily for stress calculations in connection with airborne electronic equipment. Qualifications: degree in engineering or equivalent, with five years' experience in stress work in the above or allied fields; salary £520 to £570 according to age and experience; West London area.—Write, giving full details of experience and qualifications, to Box 1689. [4524

DOWTY EQUIPMENT, Ltd., Aircraft Hydraulic Engineers, Arle Court, Cheltenham, have vacancies in their Drawing Office for experienced Draughtsmen (Design and Mechanical) and Stressmen; the working conditions, environment and prospects of advancement are excellent and the company pays good salary rates.—Write to Personnel Manager for leaflet about employment. [4497

A. V. ROE & Co., Ltd.—A vacancy will shortly occur for a young man with the necessary experience to take charge of the Flight Instrumentation and Instrument Calibration Section at Woodford Aerodromes, Cheshire; applications will only be considered from those who have a wide experience and preferably not less than a Higher National Certificate; write stating age, experience, qualifications, etc., to—The Labour Manager, A. V. Roe & Co., Ltd., Greengate, Middleton, Manchester. [4503

HANDLEY PAGE (READING), Ltd., have vacancies in their design office for junior and intermediate draughtsmen with aircraft experience; also required are stressmen with degree or Higher National Certificate with endorsements in aeronautical subjects; these positions offer excellent opportunities for advancement for the right men.—Please send full details to the Personnel Officer, Handley Page (Reading), Ltd., The Aerodrome, Woodley, Reading. [0574

PRODUCTION engineer required by precision engineering company in North-West of England with large and expanding programme of extreme variety, to take charge of established planning, ratefixing, jig and tool drawing offices and foundry; age between 30 and 35 years; engineering degree desirable, excellent prospects for energetic man who must have first rate production engineering experience; commencing salary £900 per annum plus bonus; write in confidence with full-est particulars to—The Managing Director, Box 1629. [4015

TECHNICAL assistant to development engineer in charge of research laboratory, engaged in developing equipment for aircraft required, degree in physics essential and high standard of mathematics desirable; candidates should have sound practical and design experience in industry and will be required to assist in the development of mechanical, thermal and electrical equipment of a precision nature; highly skilled practical staff available together with a well equipped laboratory.—Apply, stating age, experience and salary required, to Box 1692. [4516

BRITISH EUROPEAN AIRWAYS invite applications for the following vacancies, (a) assistant to the direct posts engineer in the project and development branch, duties will include a variety of investigations into engineering and operating costs and economics, and into economy of existing and proposed designs of aircraft for use by the Corporation, applicants should have a good degree in science or engineering, and should be under 25 years old, initial salary will be according to qualifications; (b) assistant to the operational analysis engineer in the project and development branch, duties will include analysis of statistics from flight operations and flight test on fleet aircraft, and the application of these data to design specification and route analysis problems, applicants should be under 25 years old and should have a good degree in science or engineering and some experience of aeronautical engineering, including performance measurement or calculation, initial salary will be according to qualifications and experience; in the case of both (a) and (b) above, the passing of a medical examination will be required; applications should be addressed to—The Personnel Manager, B.E.A., Head Office, Keyline House, Ruislip, Middx. [4512

SITUATIONS WANTED

PILOT A.L.T.P. and R/T, Dakota, Rapide, Proctor, 2,800 hrs., age 27, single.—Box 1628. [4508

DESIGNER-DRAUGHTSMAN, desiring greater scope, seeks responsible position with medium-sized company; 19 years experimental and production, familiar with modern manufacturing processes, some knowledge business and works management.—Box 1683. [4526

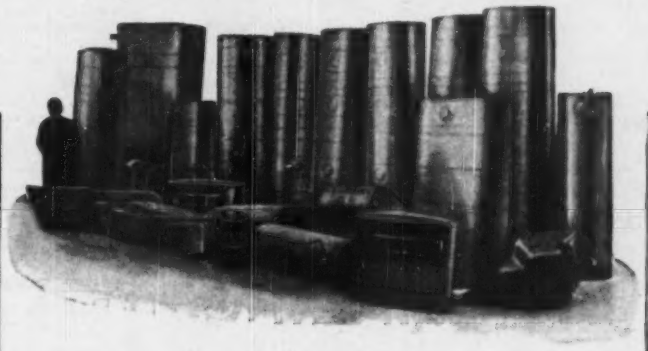
ENGINEER, M.A., Cantab, 34, married, 7 years leading aircraft manufacturers, accustomed represent firm to technical and other committee meetings, fluent French, seeks position with prospects, not necessarily aircraft, preferably liaison or assistant to executive, available next month.—Box 1705. [4585

WANTED

URGENTLY required, maintenance manual on Dakota or aircraft C.47 also handbook or manual on Sperry Auto-pilot system, A.3.—Box 1662. [4527

EVERYTHING IN SHEET METAL WORK

AND LIGHT ENGINEERING



AIRCRAFT
AUTOMOBILE
COACH AND BUS BODIES
Municipal and other ALL-METAL Vehicle Bodies

Refrigeration
COLD STORAGE
HEATING
DRYING
AIR Conditioning
MINING

TELEGRAMS: BROMELPAR, SOUTHTOT, LONDON

E. G. Brown & Co. Ltd

TELEPHONES: TOTTENHAM 2257, 2258 & 2259

161 West Rd., TOTTENHAM LONDON, N.17

BIRSO TRADE MARK

NON-FERROUS CASTINGS

Our specialised knowledge is offered to you in the supply of Castings from a few ounces up to 5 tons—in
PHOSPHOR BRONZE, GUNMETAL, MANGANESE BRONZE, ALUMINIUM BRONZE
(Tensile Strength 45 tons per sq. in.)

ALSO
Light Alloy Castings · 'BIRSO' Chill-Cast Rods and Tubes
Centrifugally-Cast Worm-Wheel Blanks · Ingot Metals
Phosphor Copper · Phosphor Tin · Precision Machined Parts
Finished Propellers, etc.

•

Fully approved by Admiralty and A.I.D.

T. M. BIRKETT & SONS LTD.
HANLEY · STAFFS
Grams: Birkett, Hanley 'Phone: Stoke-on-Trent 2184-5-6
in association with
BILLINGTON & NEWTON LTD.
LONGPORT, STOKE-ON-TRENT
Grams: Bronze, Phone, Longport 'Phone: Stoke-on-Trent 87303-4 & 88147

Offkwik

THE WORLD'S LEADING PAINT REMOVER

PAINT REMOVERS LTD

24 Ryder St, St. James, London S.W.1 Abbey 4161 (5 lines)

THE AERONAUTICAL WORLD IS SAYING — DEAL WITH:-

ROLLASON ENGINES LTD. CROYDON AIRPORT
Tel. CRO. 5151/3 CRO. 7744 Ext. 69

LARGE STOCKS OF **DE HAVILLAND GIPSY MAJORS, QUEEN III's, II's, and I's —ARMSTRONG SIDDELEY CHEETAH IX's and X's**
ALL ENGINES HAVE BEEN SERVICED AND ARE READY FOR IMMEDIATE INSTALLATION.
ENGINE HOURS VARY FROM NIL SINCE EITHER NEW OR COMPLETE OVERHAUL. QUANTITIES OF SPARES ALWAYS AVAILABLE
MAY WE QUOTE FOR YOUR REQUIREMENTS.

VERY HIGHLY COMPETITIVE PRICES QUOTED

U.S.A. U.S.A. U.S.A. U.S.A. U.S.A.

May we have your enquiries for American Aircraft Spares and repair equipment. We are specialists in

PANEL INSTRUMENTS **TEST RIGS** **AUTO PILOTS**
ANCILLARY EQUIPMENT **ENGINE SPARES** **CABLES & SUNDRIES**

OUR PRICES ARE VERY KEEN, DELIVERY EX STOCK. EXPORT ORDERS SPECIALLY WELCOME.

STARAVIA • **BLACKBUSHE AIRPORT** • **SURREY**
Phone: CAMBERLEY 1600 Phone: YATELEY 3223

COTTON BAGS
FOR SPARE PARTS, Etc.
WALTER H. FELTHAM & SON, LTD.,
Imperial Works, Tower Bridge Road,
Telephone: HOP 1784. London, S.E.1

SPINNINGS
OF QUALITY UP TO 6FT. DIA.
SMITH & ANSELL LTD.
ACOCKS GREEN, BIRMINGHAM

R.A.F. UNIFORMS
FOR OFFICERS AND W.O.s
— NEW AND RECONDITIONED —
HUGE SELECTION IN STOCK
FISHERS, 86-88 Wellington Street,
Woolwich, S.E.18. Phone: 1055

For Aviation & Travel News about Southern Africa Read

THE AIR AND TRAVEL MAGAZINE **WINGS**

Published monthly in Johannesburg and circulating throughout Southern Africa.

For further particulars consult

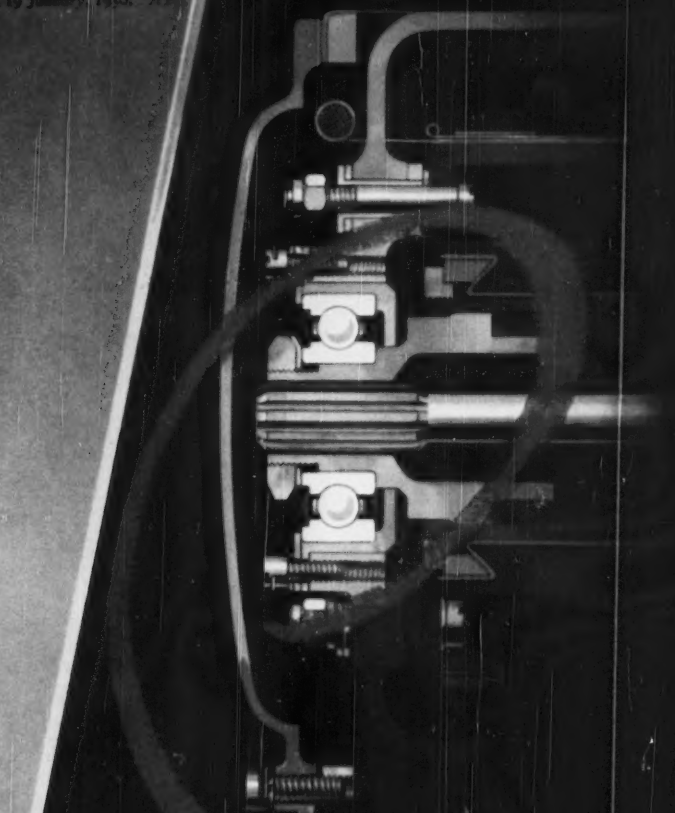
TECHNICAL PUBLICATIONS (OVERSEAS) LTD.
39, Lombard Street, London, E.C.3.
Telephone: Mansion House 6021,1127
Telegrams: "Gasify, Stock, London"

THE COLLEGE OF AERONAUTICAL AND AUTOMOBILE ENGINEERING
(of Chelsea)

Complete practical and technical training for entry to Civil and Commercial Aviation or the Automobile industry.
Entry from School-leaving age.

Syllabus from Bursar
Sydney Street, Chelsea, S.W.3.
Telephone: FLAxman 0021.

Printed in Great Britain by The Cornwall Press Ltd., 1-6, Paris Gardens, London, S.E.1, for Flight Publishing Company, Dorset House, Stamford Street, London, S.E.1. — Flight can be obtained abroad from the following: Australasia and New Zealand: Gordon & Gotch Ltd. India: A. H. Wheeler & Co. Canada: Imperial News Co., Gordon & Gotch Ltd. South African Central News Agency, Ltd., Wm. Dawson & Sons (S.A.), Ltd. United States: The International News Co. Entered as Second Class at the New York, U.S.A., Post Office.



FBC

For heavy or light loads,
for slow or high speeds,
there you will find F.B.C.
ball & parallel roller bearings.

FISCHER BEARINGS COMPANY LTD. WOLVERHAMPTON.
Associated with British Timken Ltd.

The illustration shows F.B.C. ball bearings on an aircraft generator: speed 6,000 to 10,000 r.p.m.

Bristol

engines power the majority of British airliners in current production.

Sleeve-valve

fuel economy

means extra passengers . . . The excellent specific fuel consumption of "Bristol" Hercules sleeve-valve engines gives an extra 10% payload. For many years development has been directed towards the achievement of the lowest possible fuel consumption consistent with reliability. Thousands of sleeve-valve engines supplied for civil aircraft, long-range bombers, night-fighters and carrier-borne aircraft—for which low fuel consumption is of paramount importance—give testimony to this particularly advantageous characteristic of "Bristol" Hercules single sleeve-valve engines.

THE *Bristol* AEROPLANE COMPANY LIMITED · ENGLAND